



A COMPENDIUM *of*
miniature
ORCHID
SPECIES

volume 1

Ron Parsons • Mary E. Gerritsen

Redfern Natural History Productions



To our friends and families, without whose enthusiasm and support this book would not have been possible.

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Ron & Mary.



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Ron Parsons and Mary E. Gerritsen

Edited by Alastair S. Robinson

Redfern Natural History Productions

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additional information should be addressed to the publisher.

Figure 1.1 (page ii) *Lepanthes discolor* (Grower: Marni Turkel).

Figure 1.2 (page iii) *Ceratocentron fessellii* (Grower: White Oak Orchids).

Figure 1.3 (facing page) *Mediocalcar agathodaemonis* (Grower: Peter and Helen Jackson).



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Figure 1.4 (above) A trio of fiery red *Bulbophyllum kwanwuensis* flowers (Grower: Hanging Gardens).



Prologue

Why miniature orchids? Imagine a collection of these tiny, gem-like plants, their myriad colours and intriguing postures dancing in a gentle breeze. You will experience an almost infinite variety of shapes, textures and intricacy of design in their often delicate blooms, not to mention enticing fragrances. These are plants that are attractive both in and out of bloom and, for those of us short on space, their diminutive nature is an added plus. The ability to grow an incredible variety of beautiful orchids in a limited space, be it a windowsill, terrarium or a light box in a spare room is wondrous. These are the features that initially attract, and later draw into addiction, the orchid hobbyist to orchids of miniature stature.

This book provides an in depth look at approximately 500 of the world's smallest orchid species. All of the selected species are 15 centimetres (6 inches) or less in height – based on individual growths, excluding the inflorescence – and all are in the tribe Epidendroideae. Our 15 cm maximum height sets the smallest size limit to date of any book written on miniature orchids. Some orchid books include the length of the inflorescence in their size limit, so that plant and inflorescence together must fall within a certain size, while we have allowed for inflorescences of any length. Some species have forms that are both smaller and larger than 15 cm; such taxa were excluded. A number of species that were included may grow to form large sized specimens if allowed to spread, including many *Bulbophyllum*; even so, individual growths of such plants do not exceed 15 cm. Our focus has been on epiphytic and lithophytic orchids. Most terrestrial orchids, though often grown successfully for a number of years in cultivation, usually decline over time for a variety of reasons. Although advances have been made in the artificial cultivation of terrestrials in recent years, the majority are obtained by collection from their native habitats, which only contributes to their extirpation. Given our imposed size limitations, there are several major groups of well-known cultivated orchids that could not be included here, including the *Catasetum* group, *Stanhopea*, *Lycaste*, *Cymbidium* and their relatives, and also the vast majority of the slipper orchids. With over 5000 epiphytic and lithophytic orchid species readily meeting our size criteria, it was not feasible to provide a complete compendium of all miniatures; thus, we feature our own selection of the most popular, showy, available, curious or otherwise culturally desirable plants, though many of these certainly remain rare in collections.



Figure 1.5 (above) Clumps of flowering *Acianthera leptotifolia* crowd a log suspended above a stream in southern Brazil (Photo: Leonardo Desordi Lobo).

Figure 1.6 (facing page) *Bulbophyllum pleurothallidanthum* flowers are certainly reminiscent of those produced by pleurothallids (Grower: Gerardus Staal).

One of the greatest challenges in writing this book was the enormous and ongoing taxonomic reassessment that has resulted from the recent applications of DNA sequencing to the understanding of plant relationships. As such, it is not always clear what name is correct or current, or which authority should be followed, if one even agrees with their position at all. Perhaps a more critical issue is how best to write a book that will survive such nomenclatural turmoil. Names will have changed yesterday and today, and no doubt they will change again before this work goes to press. Indeed, as expected, during the final editing phase of this book, a number of species and entire genera had undergone further taxonomic revision. Whatever the case, the individual species described herein remain biologically unchanged, despite shifting taxonomy, and remain readily identifiable!

Taxonomy itself is not an exact science, and orchid species, as with all living organisms, are inherently variable. There are many species that are highly similar to one another, and these are subject to the opinions of the taxonomists making the determination, who may recognise them as distinct, or as mere varieties or subspecies of the nominate race. Sometimes there are more opinions than there are species! Species with wide distributions can vary considerably, with populations at the extreme limits of their range often appearing to be distinct taxa. Plants are continually evolving, and some species naturally die out while others, through natural hybridisation, random mutation and speciation, are coming into being as they adapt to new or changing environmental conditions.

To offer consistency, our compromise to all of this turmoil was to follow the current Kew World Checklist of Selected Plant Families (as of June 2013), with minor exceptions, and to provide for each species discussed a comprehensive list of all homotypic and heterotypic synonyms. This is followed by a brief physical description of the vegetative characteristics, range, habitat and elevation, conservation status and detailed cultural information. To avoid excessive repetition, plant characteristics typical for all species in a genus are provided in the generic description. Every species discussed is represented by one or more images that will aid both the novice and expert alike in identification. Except where credited otherwise, all photographs are the work of Ron Parsons. Where possible, *in situ* photographs of the species have also been included. The dimensions of individual flower parts are not given. We have opted to provide the largest dimension of overall flower size, whether it be height, width or length.

Information was gleaned from as many sources as possible, including the original descriptions, books, monographs, journals, magazines, theses, personal communications with specialists and from living specimens. Despite our best efforts, there may be a few misidentified species or errors of fact. We apologise if this proves to be the case, but it should be noted that physical features can and do vary from plant to plant and even sometimes within an individual, depending on conditions of culture. Moreover, plants may occasionally grow larger than the stated size ranges due to regular watering and feeding. Additionally, while we have endeavoured to provide detailed habitat and distribution information, new range and elevation extensions will undoubtedly come to light in time. This is particularly true for those species for which there was minimal to no available information on habitat, elevation or distribution. Where possible, we have provided the conservation status as currently known.

Four appendices are included for the reference of the reader. Appendix I presents a comprehensive list of miniature species that meet our size limitations, but which were not discussed in the book. Some species have both small and large forms; where the larger forms exceeded our size limitations, they were excluded from this appendix. Appendix II provides a list of selected “nearly miniature” and culturally desirable species that range roughly between 15 and 20 cm in height. This list also includes species that have both small and large forms that otherwise would have been included in Appendix I. Appendix III provides a list of vendors who sell or specialise in miniature orchids, and Appendix IV provides a few suggestions for books about orchid diseases, and a list of sources for orchid supplies, lighting, misting and cooling systems, prefabricated wardian cases, plant stands and kits.

We sincerely hope that you will find a place for this book in your collection, and may it provide you as much joy and education in its reading as it did for us in its preparation!

Ron Parsons and Mary Gerritsen
June 2, 2013.



Figure 1.7 (above) The substantial, pristine flowers of *Cattleya alarii* are very handsome subjects (Grower: Judy Carney).



Foreword

Miniature orchids have long been popular subjects and, for a number of different reasons, their popularity is continually increasing. Significantly, energy costs are rising steadily in most parts of the world, and fewer and fewer people can afford to run large greenhouses. Also, there can be no orchid grower who would not appreciate more room in which to grow their plants. Orchid enthusiasts have their own version of Parkinson's Law – which states that work expands so as to fill the time available for its completion – and thus orchid collections expand to fill the space available to grow them. Of course, turning to miniature orchids does not solve this problem, but it does mean that one can grow more species in a given area before finally running out of room!

Mary Gerritsen and Ron Parsons are uniquely qualified to write about these little plants. Mary is a research scientist, well-versed at writing in meticulous detail, and Ron is a professional photographer able to document their perfect features in detail. Both have large collections of miniature orchids that they have sustained for many years. They have both also travelled widely and observed how plants grow in their natural habitats. As such, Ron has amassed a vast collection of photographs of orchids and other plants taken in many countries over many years.

This is by no means the first book to be written about miniature orchids, but it is by far the most comprehensive, and certainly the best and most lavishly illustrated. Few growers realise just how many small-growing orchids exist, or that they can be acquired from traders if an effort is made to seek them out. The authors estimate that there are about 5000 species that fit their criterion of being less than 15 centimetres (6 inches) tall. Here, about 500 species are described and illustrated, with sumptuous photographs showing both flowers in close-up and how the plants grow. Even their own large collections could not provide so sufficient a range of species as addressed in this work, and many other growers have kindly allowed their plants to be photographed for the book.

The result of their wide ranging efforts is a truly authoritative book, which covers far more than just the descriptions of species of interest and how they should be cultivated. The structure of orchids is also clearly explained with the help of further illustrations, not only of the flowers, but also of the range of leaves, pseudobulbs, colours, growth habits and roots that one might encounter. Orchid nomenclature, which can puzzle even experienced growers, is also clearly explained.

This is a book that will inform both long-time growers and newcomers alike to the world of orchids.

Isobyl la Croix



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Figure 1.9 (facing page) The spectacular little flower of *Porroglossum* aff. *lycinum* (Grower: Marni Turkel).

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Figure 1.10 (facing page) The strikingly coloured flower of *Domingoa haematochila* (Grower: Brad Cotten).





Introduction to the Orchid Family

One of the largest of all flowering plant families, the vast orchid family (Orchidaceae) is unsurpassed in the plant kingdom in terms of its variety and splendour, with over 26,000 species across more than 800 genera that vary as markedly in form as they do in ecology. Indeed, orchids occur on every continent of the world with the exception of Antarctica, ranging from the sub-Antarctic islands, north across the temperate, tropical and desert areas of the globe to the bitterly cold tundra that lies within the Arctic circle. They are found from littoral zones to alpine areas above the tree line in virtually every type of habitat, growing as terrestrials (in the ground), epiphytes (on other plants) or lithophytes (on rocks) in an array of different ecological conditions.

Orchids are amongst the most highly evolved of all flowering plants (Angiosperms), employing almost every imaginable pollination mechanism. The majority of Angiosperms fall into two classes according to the number of cotyledons (embryonic or seed leaves, often the first leaf-like structures to emerge from a germinating seed) they possess. Dicotyledons (dicots) have two cotyledons, whilst monocotyledons (monocots) have just one. The two groups each exhibit other general morphological differences (see Table 1.1), but there are some exceptions to these characters.

Table 1.1 A comparison of the common characteristics of monocotyledonous and dicotyledonous plants.

Character	Monocotyledons	Dicotyledons
Embryonic leaves	One	Two
Pollen	Single furrow or pore	Three furrows or pores
Flower parts	In multiples of three	In multiples of four or five
Major leaf veins	Parallel	Reticulate (network-like)
Stem vascular bundles	Scattered	Annular (concentric circles)
Roots	Adventitious	From radicle
Secondary growths	Absent	Often present

The monocots include some widely recognised plant families, including the Commelinaceae (spiderwort family), Liliaceae (lily family), Araceae (aroid family), Agavaceae (agave family), Arecaceae (palm family), Amaryllidaceae (Amaryllis family), Iridaceae, (iris family), Juncaceae (rush family), Cyperaceae (sedge family), Poaceae (grass family), Zingiberaceae (ginger family), and of course the aforementioned Orchidaceae (orchid family).

The orchid family is included within the order Asparagales, and five subfamilies of orchid are recognised, namely Apostasioideae, Cypripedioideae, Vanilloideae, Orchidoideae and Epidendroideae.

The Apostasioideae are the most primitive, and only two genera, *Neuwiedia* and *Apostasia*, sit within this subfamily. Apostasioid orchids have 2 or 3 stamens, a symmetrical stigma, and pollen that is released as single, non-sticky grains. In contrast, the orchids of the other subfamilies all have sticky or fused pollen and an asymmetrically broad stigma with lobes that all face the centre of the flower.

The Cypripedioideae have a pouch-like lip petal, two functional stamens and a median anther that is modified into a shield-like staminode. Five genera are recognised within this subfamily, namely *Cypripedium*, *Paphiopedilum*, *Phragmipedium*, *Mexipedium* and *Selenipedium*.

The Vanilloideae are monandrous, with a single, functional stamen, lack pollinia, and are classified into two major tribes, Pogonieae and Vanilleae. Familiar genera within this subfamily include *Vanilla*, *Pogonia*, *Cleistes* and *Isotria*.

The Orchidoideae are monandrous, with sectile (capable of being severed) or granular pollinia, an anther with an acute apex, soft stems, leaves that are convolute but not plicate, and a total absence of the silica bodies found in all other orchid groups. All members

Figure 1.11 (facing page) The wonderful flowers of *Chiloschista lunifera* are as handsome in form as they are in colouration (Grower: Marni Turkel).

of this subfamily have a terrestrial habit and are classified into four tribes, Orchideae (*Habenaria*, *Ophrys*, *Orchis* etc.), Diseae (*Disa*, *Satyrium* etc.), Cranichideae (*Cranichis*, *Pterostylis*, *Chloraea*, *Goodyera*, *Spiranthes* etc.) and Diurideae (*Acianthus*, *Caladenia*, *Chiloglottis*, *Corybas*, *Diuris*, *Prasophyllum*, *Thelymitra* etc.).

The Epidendroideae are the largest subfamily, comprising over 15,000 species. The majority of taxa are epiphytic in habit and typically have pseudobulbs, but there are a number of terrestrial genera, such as *Epipactis*, and even a few myco-heterotrophs – plants that parasitise mycorrhizal fungi. Orchids of the Epidendroideae have a single anther that is strongly convex to fully erect, hard pollinia (most species), and an entire or three-lobed stigma with a beak. The apical part of the middle stigmatic lobe forms a stipe, or pollinia stalk. All of the orchids discussed in this work fall within the Epidendroideae.

The Epidendroideae are divided into two subgroups known as the Higher Epidendroids and Lower Epidendroids. Below this level, the Epidendroideae are divided further into tribes and subtribes. There are various classifications at this level, but that proposed in the *Genera Orchidacearum* series (Pridgeon, Crib, Chase & Rasmussen, 2006; 2009) is observed here (see Table 1.2). The Dendrobieae and Vandeae tribes have been subject to considerable revision, and their treatment in the *Genera Orchidacearum* is due to be published during 2013.



Figure 1.12 (above) *Porroglossum dreisei* is a member of the subtribe Pleurothallidinae, within the tribe Epidendreae. In common with all other taxa featured in the species section of this work, it is a member of the vast orchid subfamily Epidendroideae (Grower: Ron Parsons).

Table 1.2 Tribes and subtribes of the Epidendroideae, as outlined in *Genera Orchidacearum*.

Tribe	Subtribe	Representative genera
Arethuseae	Coelogyninae	<i>Bletilla</i> , <i>Coelogyne</i> , <i>Dendrochilum</i> , <i>Panisea</i> , <i>Pleione</i> , <i>Pholidota</i> , <i>Thunia</i> etc.
	Arethusinae	<i>Arethusa</i> , <i>Arundina</i> , <i>Calopogon</i> etc.
Calypsoeae		<i>Calypso</i> , <i>Corallorhiza</i> , <i>Govenia</i> , <i>Oreorchis</i> etc.
Collabieae		<i>Acanthephippium</i> , <i>Ancistrochilus</i> , <i>Calanthe</i> , <i>Collabium</i> , <i>Gastrorchis</i> , <i>Nephelaphyllum</i> , <i>Phaius</i> , <i>Spathoglottis</i> , <i>Tainia</i> etc.
Cymbidieae	Catasetinae	<i>Catasetum</i> , <i>Clowesia</i> , <i>Cynoches</i> , <i>Dressleria</i> , <i>Galeandra</i> , <i>Grobya</i> , <i>Mormodes</i>
	Coeliopsidinae	<i>Coeliopsis</i> , <i>Lycomormium</i> , <i>Peristeria</i>
	Cymbidiinae	<i>Acriopsis</i> , <i>Ansellia</i> , <i>Cymbidium</i> , <i>Grammatophyllum</i> , <i>Graphorkis</i> , <i>Thecopus</i> , <i>Thecostele</i> etc.
	Cyrtopodiinae	<i>Cyrtopodium</i>
	Eriopsidinae	<i>Eriopsis</i>
	Eulophiinae	<i>Cymbidiella</i> , <i>Eulophia</i> , <i>Eulophiella</i> , <i>Geodorum</i> , <i>Grammangis</i> , <i>Oeceoclades</i> etc.
	Maxillariinae	<i>Anguloa</i> , <i>Bifrenaria</i> , <i>Brasiliorchis</i> , <i>Camaridium</i> , <i>Christensonella</i> , <i>Cryptocentrum</i> , <i>Lycaste</i> , <i>Maxillaria</i> , <i>Maxillariella</i> , <i>Mormolyca</i> , <i>Neomoorea</i> , <i>Ornithidium</i> , <i>Rudolfiella</i> , <i>Scuticaria</i> , <i>Sudamerlycaste</i> , <i>Trigonidium</i> , <i>Xylobium</i> etc.
	Oncidiinae	<i>Aspasia</i> , <i>Brassia</i> , <i>Caluera</i> , <i>Capanemia</i> , <i>Caucaea</i> , <i>Centroglossa</i> , <i>Chytroglossa</i> , <i>Cischweinfia</i> , <i>Comparettia</i> , <i>Cuitlauzina</i> , <i>Cyrtorchilum</i> , <i>Erycina</i> , <i>Fernandezia</i> , <i>Gomesa</i> , <i>Grandiphyllum</i> , <i>Hintonella</i> , <i>Hofmeisterella</i> , <i>Ionopsis</i> , <i>Leochilus</i> , <i>Lockhartia</i> , <i>Macroclinium</i> , <i>Miltonia</i> , <i>Miltoniopsis</i> , <i>Notylia</i> , <i>Oncidium</i> , <i>Ornithocephalus</i> , <i>Otoglossum</i> , <i>Phymatidium</i> , <i>Platyrhiza</i> , <i>Plectrophora</i> , <i>Psychopsis</i> , <i>Rhynchostele</i> , <i>Rodriguezia</i> , <i>Rossiglossum</i> , <i>Telipogon</i> , <i>Tolumnia</i> , <i>Trichocentrum</i> , <i>Trichoceros</i> , <i>Trichopilia</i> , <i>Zygostates</i> etc.
	Stanhopeinae	<i>Acineta</i> , <i>Cirrhaea</i> , <i>Coryanthes</i> , <i>Embreea</i> , <i>Gongora</i> , <i>Houlletia</i> , <i>Kegeliella</i> , <i>Lacaena</i> , <i>Lueddemannia</i> , <i>Paphinia</i> , <i>Polycycnis</i> , <i>Schlimmia</i> , <i>Sievekingia</i> , <i>Stanhopea</i> etc.
	Vargasiellinae	<i>Vargasiella</i>
	Zygopetalinae	<i>Batemannia</i> , <i>Benzingia</i> , <i>Chaubardia</i> , <i>Chaubardiella</i> , <i>Chondorhyncha</i> , <i>Chondroscaphe</i> , <i>Cochleanthes</i> , <i>Dichaea</i> , <i>Galeottia</i> , <i>Huntleya</i> , <i>Kefersteinia</i> , <i>Koellensteinia</i> , <i>Pabstia</i> , <i>Pescatoria</i> , <i>Promenaea</i> , <i>Stenia</i> , <i>Warczewiczella</i> , <i>Warrea</i> , <i>Zygopetalum</i> , <i>Zygosepalum</i> etc.
Dendrobieae	Bulbophyllinae	<i>Bulbophyllum</i> , <i>Drymoda</i> , <i>Monomeria</i> , <i>Saccoglossum</i> , <i>Sunipia</i> , <i>Trias</i>
	Dendrobiinae	<i>Dendrobium</i> (including <i>Cadetia</i> , <i>Diplocaulobium</i> , <i>Dockrillia</i> , <i>Epigeneium</i> etc), <i>Pseuderia</i>
Diceratosteleae		<i>Diceratostele</i>
Epidendreae	Bletiinae	<i>Basiphyllaea</i> , <i>Bletia</i> , and <i>Hexalectris</i>
	Chysinae	<i>Chysis</i>
	Coeliinae	<i>Bothriochilus</i>
	Laeliinae	<i>Alamania</i> , <i>Arpophyllum</i> , <i>Barkeria</i> , <i>Brassavola</i> , <i>Broughtonia</i> , <i>Cattleya</i> , <i>Caularthron</i> , <i>Constantia</i> , <i>Dinema</i> , <i>Domingoa</i> , <i>Encyclia</i> , <i>Epidendrum</i> , <i>Guarianthe</i> , <i>Homalopetalum</i> , <i>Isabelia</i> , <i>Laelia</i> , <i>Leptotes</i> , <i>Meiracyllium</i> , <i>Myrmecophila</i> , <i>Oestlundia</i> , <i>Prosthechea</i> , <i>Rhyncolaelia</i> , <i>Tetramicra</i> etc.
	Pleurothallidinae	<i>Acianthera</i> , <i>Anathallis</i> , <i>Andinia</i> , <i>Barbosella</i> , <i>Brachionidium</i> , <i>Dracula</i> , <i>Dresslerella</i> , <i>Dryadella</i> , <i>Kraenzlinella</i> , <i>Lepanthes</i> , <i>Lepanthopsis</i> , <i>Masdevallia</i> , <i>Myoxanthus</i> , <i>Octomeria</i> , <i>Pabstiella</i> , <i>Penducella</i> , <i>Phloeophila</i> , <i>Platystele</i> , <i>Pleurothallis</i> , <i>Pleurothallopsis</i> , <i>wwglossum</i> , <i>Restrepia</i> , <i>Scaphosepalum</i> , <i>Specklinia</i> , <i>Stelis</i> , <i>Trichosalpinx</i> , <i>Trisetella</i> , <i>Zootrophion</i>
	Ponerinae	<i>Helleriella</i> , <i>Isochilus</i> , <i>Ponera</i> etc.
Gastrodieae		<i>Gastrodia</i> , <i>Didymoplexis</i> etc.
Malaxideae		<i>Malaxis</i> , <i>Liparis</i> , <i>Oberonia</i> etc.
Neottieae		<i>Neottia</i> , <i>Cephalanthera</i> , <i>Epipactis</i> , <i>Limodorum</i> etc.

Nervilieae	Nerviliinae	<i>Nervilia</i>
	Epipogiinae	<i>Epipogium</i> etc.
Palmorchideae		<i>Palmorchis</i>
Podochileae	Eriinae	<i>Appendicula</i> , <i>Bryobium</i> , <i>Campanulorchis</i> , <i>Ceratostylis</i> , <i>Conchidium</i> , <i>Cryptochilus</i> , <i>Eria</i> , <i>Mediocalcar</i> , <i>Mycaranthes</i> , <i>Pinalia</i> , <i>Podochilus</i> , <i>Porpax</i> , <i>Trichotosia</i> etc.
	Thelasinae	<i>Phreatia</i> , <i>Thelasis</i> etc.
Sobralieae		<i>Elleanthus</i> , <i>Sobralia</i> etc.
Triphoreae	Triphorineae	<i>Triphora</i> etc.
	Diceratostelinae	<i>Diceratostele</i>
Tropidieae		<i>Tropidia</i> , <i>Corymborkis</i>
Vandaeae	Aeridinae	<i>Acampe</i> , <i>Aerides</i> , <i>Amesiella</i> , <i>Arachnis</i> , <i>Ascocentrum</i> , <i>Ceratocentrum</i> , <i>Ceratochilus</i> , <i>Chiloschista</i> , <i>Christensonia</i> , <i>Cleisostoma</i> , <i>Cleistocentrum</i> , <i>Dyakia</i> , <i>Esmeralda</i> , <i>Euanthe</i> , <i>Gastrochilus</i> , <i>Haraella</i> , <i>Holcoglossum</i> , <i>Hymenorchis</i> , <i>Luisia</i> , <i>Malleola</i> , <i>Microsaccus</i> , <i>Neofinetia</i> , <i>Ornithochilus</i> , <i>Papilionanthe</i> , <i>Papillilabium</i> , <i>Paraphalaenopsis</i> , <i>Pelatantheria</i> , <i>Phalaenopsis</i> , <i>Pteroceras</i> , <i>Renanthera</i> , <i>Rhyncostylis</i> , <i>Robiquetia</i> , <i>Sarcochilus</i> , <i>Schoenorchis</i> , <i>Sedirea</i> , <i>Seidenfadenia</i> , <i>Staurochilus</i> , <i>Stereochilus</i> , <i>Thrixspermum</i> , <i>Trichoglottis</i> , <i>Tuberolabium</i> , <i>Vanda</i> , <i>Vandopsis</i> etc.
	Aerangidinae	<i>Aerangis</i> , <i>Angraecopsis</i> , <i>Bolusiella</i> , <i>Chamaeangis</i> , <i>Cyrtorchis</i> , <i>Diaphananthe</i> , <i>Eurychone</i> , <i>Microcoelia</i> , <i>Microterangis</i> , <i>Mystacidium</i> , <i>Plectrelminthus</i> , <i>Podangis</i> , <i>Rangaeris</i> , <i>Solenangis</i> , <i>Tridactyle</i> etc.
	Angraecinae	<i>Aerantes</i> , <i>Angraecum</i> , <i>Calyptrochilum</i> , <i>Campylocentrum</i> , <i>Cryptopus</i> , <i>Dendrophylax</i> , <i>Jumellea</i> , <i>Neobathiea</i> , <i>Oeonia</i> , <i>Oeoniella</i> , <i>Podangis</i> , <i>Sobennikoffia</i> etc.
	Polystachyinae	<i>Neobenthamia</i> , <i>Polystachya</i> etc.
Xerorchideae		<i>Xerorchis</i>
Unplaced	Adrorhizinae	<i>Adrorhizon</i>

Orchid Nomenclature

Orchid names can be difficult to understand, but orchid nomenclature, in common with all plants and animals, follows consistent rules. A species always has a binomial name, for example *Masdevallia caudata*; the first name is the genus to which it belongs, *Masdevallia*, whilst the second name, *caudata*, is the specific or species name. The specific name is often descriptive, referring to some feature of the species (*caudata* means “with a tail”) and is usually derived from a Latin or Greek word. Species may also be named in honour of people, such as the discoverer of a species. Such commemorative names can be genitive or adjectival in form. Generally, for a genitive name ending in *-er* or a vowel, *-i* is added (e.g. *rabei*), the exception being names that end in *-a*, to which *-e* is added to form the suffix *-ae* (e.g. *bragae*). If the name ends in a consonant, an extra *-i-* is added along with the genitive ending appropriate to the gender of the person being named, forming *-ii* for a man (e.g. *thorelii*) and *-iae* for a woman (e.g. *lewisiae*). For adjectival names, similar rules apply, and in such cases the suffix will take the form *-(i)ana*, *-(i)anus* or *-(i)anum* (e.g. *wendlandianum*) depending upon the root name and the gender of the person being commemorated. Species are also often named for the area in which they were first found; in this instance, the suffixes *-(i)ensis*, *-icus* or *-inus* prevail (e.g. *philippinensis*). Another common suffix is *-icola*, which means “inhabiting”. Thus *rupicola* suggests that a plant grows on rocks, whilst *monticola* alludes to taxa that inhabit mountains.

Additional taxonomic ranks exist below genus and species. A **subspecies** (ssp.) is usually geographically isolated and exhibits consistently different physical characteristics. A subspecies is unable to interbreed freely with the nominate species because of geographic or physical isolation, rather than genetic incompatibilities, and may even have different pollinators. The term “subspecies” is often misused for disjunct populations of a species that are otherwise physically identical.

A **variety** (var.) is a distinct taxonomic rank below species that usually refers to populations with some distinct morphological feature(s), such as colour, size or shape. Varieties often form distinct populations, but are not necessarily geographically isolated.



Figure 1.13 (above) *Bulbophyllum hirundinis* produces fantastically coloured flowers that graduate from orangey-red to yellow (Grower: Hanging Gardens).

The term **form** (f.) from the Latin *forma* (pl. *formae*) refers to a secondary taxonomic rank below that of variety, and usually refers to populations with a noticeable, but minor difference. For example, white flowered forms of otherwise differently coloured species are sometimes referred to as f. *alba* (also var. *alba*). Forms occur in the general population of a species. The term “variety” is often misapplied to colour forms in cultivation.

Natural hybrids with Latinised names are designated by the use of an “x” that precedes the specific name, for example *Masdevallia* x *wubbenii*. This naturally occurring cross is found in areas where ranges of the parent species, *Masdevallia triangularis* and *M. wagneriana*, overlap. Where the cross *M. triangularis* x *M. wagneriana* is made artificially, it is good practice to write the cross out in full rather than resort to using the Latin names of equivalent natural hybrids.

Orchid Morphology

Flowers

With over 26,000 species, variation in the shape, size, colours and textures of flowers in the orchid family is mind-boggling. Even so, the flowers of orchids share a number of basic floral features that collectively distinguish them from the flowers of all other flowering plants. These features are zygomorphy, the presence of a labellum, a column, the rostellum, and two or more pollinia.

The flowers of orchids (Figure 1.14, Figure 1.15 and Figure 1.16) exhibit **zygomorphic** (bilateral) symmetry, meaning that an orchid flower can be vertically divided to yield two longitudinal mirror-image halves. This is in contrast to flowers with **actinomorphic** (radial) symmetry; these can be divided equally along three or more planes by rotation about the centre of the flower.

As monocots, the floral parts of orchids are in multiples of three. The outer three segments, known as the **sepals**, form the exterior, protective part of the flower bud. The sepals of orchids are **petaloid**, functioning like a petal. The sepals can be completely free to almost entirely connate (tubular, as in *Masdevallia mendozae*). The two lateral sepals are usually identical, while the dorsal sepal can differ somewhat in shape and/or size. In some genera, including many Bulbophyllinae and Pleurothallidinae, the lateral sepals are mostly to completely fused to form what is known as a **synsepal**.

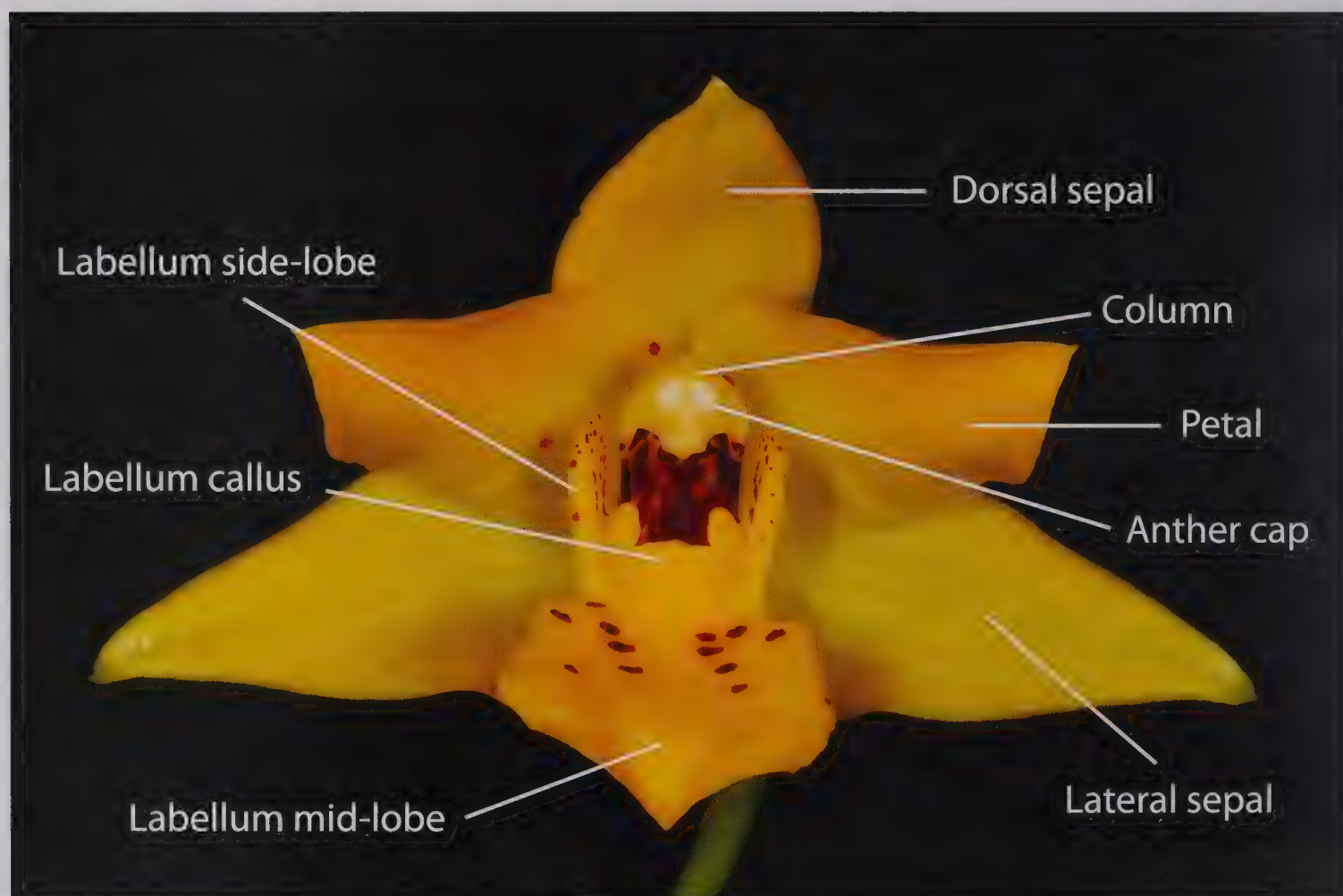


Figure 1.14 (above) A typical orchid flower annotated to assist with the identification of all key components discussed in this section.

The inner three segments of an orchid flower are the **petals**. Petals may be as large as the sepals, or tiny and insignificant. Two of the petals are usually identical, whilst the third, known as the **labellum** or **lip**, is specially modified and typically the showiest part of an orchid flower. Lips can vary markedly in shape from flat to convex, concave, tubular or pouch-like, and the margins can be entire, crispate, denticulate, ciliate, fimbriate, lacerate, or any combination thereof. The lip, which acts as a landing pad for insect pollinators and a visual guide for others, is often larger in size than the other petals, with complex patterns, colours, fringes, hairs and calli. The **calli** may consist of keels, fleshy pads, discs, plates, ridges or specula, among others. Lips can be relatively simple (one lobed)



Figure 1.15 (above) The flower of *Masdevallia coriacea* differs superficially in its form, however the same essential components are present, and additional features identified.

Figure 1.16 (above) The flower of *Restrepia sanguinea* differs in turn, if somewhat more obviously. The three blooms illustrated represent the vast majority of resupinate orchid flowers addressed here.

or complex (three-lobed, with a mid-lobe and two side-lobes). Highly complex three-lobed lips (Figure 1.16) are further divided into the **hypochile** (basal portion), **mesochile** (mid-portion) and **epichile** (distal portion). Lips are often partially united with the column and can be sessile, hinged, or even act as a trigger, temporarily trapping the pollinator (as in *Porroglossum*). In resupinate flowers, the lip is the lowermost of the petals, whereas in non-resupinate flowers the lip is held uppermost (Figure 1.18).

Nectaries are glands that produce nectar, the principal reward offered to pollinators by orchid flowers. One type of nectary is called a **spur**. Spurs are tubular or sac-like extensions of one or more flower segments, most often the lip. They are a striking feature of Angraecoid orchid flowers. In some orchids, the nectary is less obvious, running through the stem of the flower and evident only upon dissection; this is known as a **cuniculus**. Other orchids may have a shallow nectary between the column and the lip, between the column foot and the base of the lip or on the column foot itself.

Elaiophores are a specialised type of oil-producing gland found on *Ornithocephalus* and other genera in the Oncidiinae (such as the former *Sigmatostalix* and some *Gomesa*), *Rudolfiella* and *Grobya* among others. They may be located upon the petals, on the callus of the lip, or on the column. Elaiophores attract various types of bee, which use the oils mixed with pollen to feed to their larvae, as well as to seal and waterproof nest cells. **Osmophores** are found on many species of orchids; these specialised glands produce fragrance to attract pollinators. Osmophores can be borne on the sepals, petals or part of the lip. In some genera of the Pleurothallidinae, such as *Restrepia*, the clubbed tips of the petals and/or sepals contain osmophores. The placement of the osmophores on the orchid flower is critical to the attraction of pollinators (Figure 1.16).

Another distinguishing character is the presence of a **column**, also known as the **gynostemium**, which is formed by the fusion of the stamens and pistil into a single structure. The only other plant families with columns are the Aristolochiaceae (Dutchman's pipes) and Stylidiaceae (triggerplants), although their columns are different in structure. Orchid flowers are thus usually **bisexual**, having both male and female reproductive parts. There are a small number of orchid genera that have dimorphic flowers, as in the genera *Catasetum* and *Cycnoches*, and these bear male and female flowers, usually on separate spikes; there are occasional instances of inflorescences having both male and female flowers, and rarely, hermaphroditic flowers. Species in which male and female flowers are separate, but borne on a single plant, are called **monoecious**. At the apex of the column is the **column** or **anther cap**, which serves to protect the pollinia from being easily dislodged. Members of the Cypripedioideae possess a **staminode**, a sterile stamen modified to act as a shield to protect the pollinia in a manner similar to the anther cap.

The vast majority of orchids produce cohesive packets of pollen known as **pollinia**. These usually occur in groups of 2, 4, 6 or 8 (or 12 in at least one species). When viewed under a microscope, the structural features of pollinia differ markedly between species, and these features are often used as taxonomic characters. Pollinia differ in the degree of cohesion, from soft and sectile (composed of subunits) to hard. Hard pollinia occur in most Epidendroideae. Other orchids, such as the Orchidoideae, have soft, mealy pollinia that taper into a **caudicle** (stalk) that is attached to the viscidium. Pollinia may be joined to a **stipe** (a thin stalk) or a caudicle that may in turn be attached to the sticky **viscidium** (a sticky pad). Collectively, the pollinia, caudicles, stipes and viscidia are called the **pollinarium**. There is an incredible degree of variation in the structure of the pollinarium between the different orchid taxa.

Projecting from the column is a dual-purpose structure known as the **rostellum**. Structurally, it separates the male stamen from the female gynoecium, serving as a means of preventing self-fertilisation. The apex bears a sticky material that is applied to the pollinator as it enters the flower; when the pollinator backs out, this substance ensures that the dislodged pollinia stick to it.

An interesting feature of most orchids is **resupination** (Figure 1.18). This is simply defined as the twisting of the ovary about its central axis by 180 degrees as the bud develops, such that the lip is lowermost when the flower opens. The lower position of the lip facilitates landing by insect pollinators and other functions in the pollination process. Some orchids have non-resupinate flowers; this can occur when no twisting occurs at all (the majority of cases), or as a consequence of the ovary twisting 360 degrees (as in some *Angraecum*).



Figure 1.17 (above) A mounted *Cattleya acuiensis* plant in heavy bloom. In common with most orchids, it produces flowers that are resupinate, the lip orientated lowermost (Grower: Chris Nicholas).

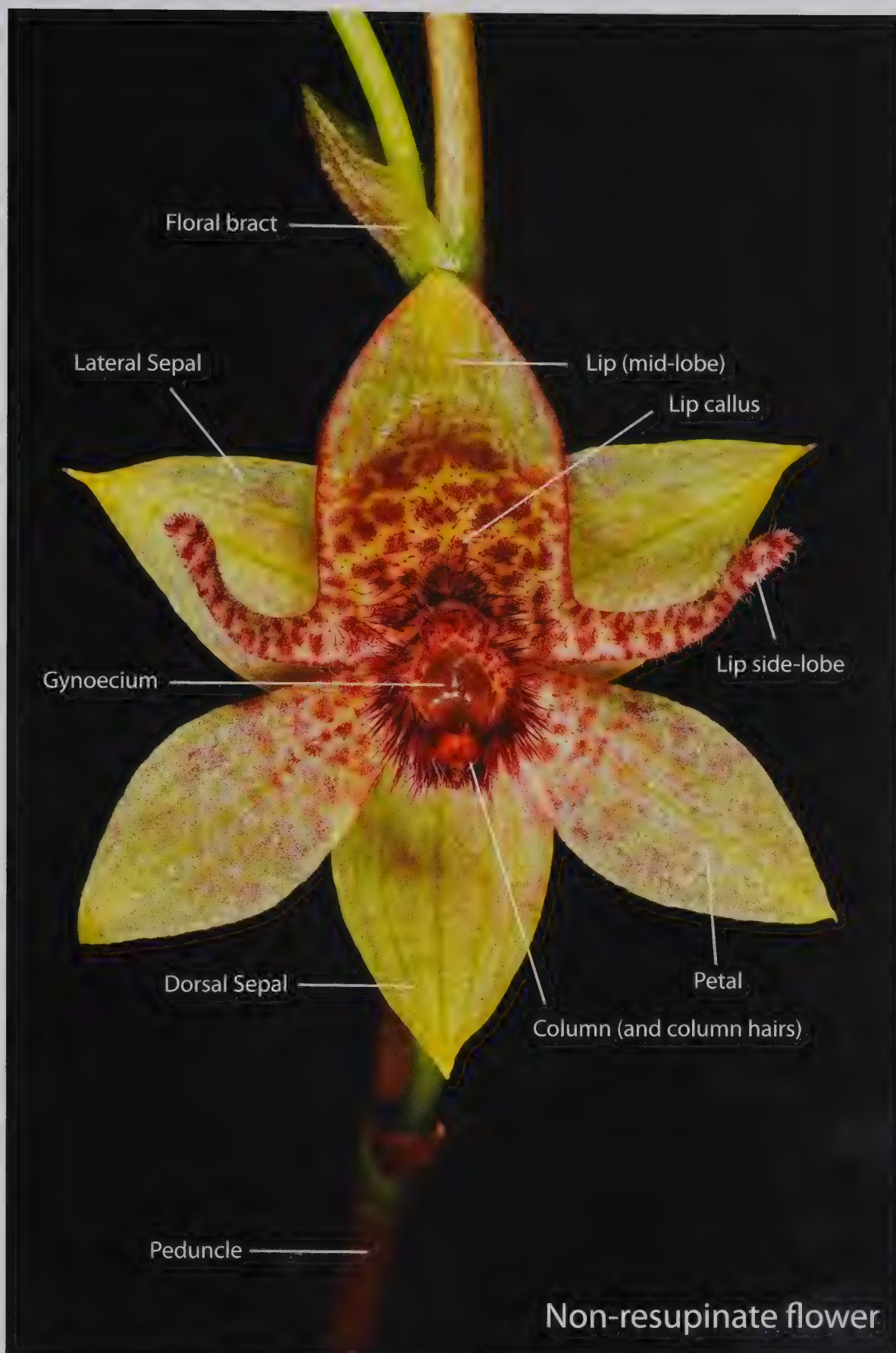


Figure 1.18 (above) The flower of *Trichoceros antennifera* is non-resupinate. That is, the ovary has not twisted about its central axis so as to position the lip in a lowermost position when the bloom opens. This is in contrast with the majority of orchid blooms, which are resupinate.

Orchid Pollination

Many papers and entire books have been written on the science of orchid pollination. Needless to say, this is an extremely fascinating and highly specialised aspect of the biology of these amazing flowers. Orchids can be pollinated by numerous insect species, including bees, wasps, flies, moths, butterflies, fungus gnats, mosquitoes, beetles and ants, as well as by some birds and bats. Even ombrophily (pollination by rain) has been reported in *Acampe*. Flowers that open to allow pollination are called **chasmogamous**, while those of the many self-pollinating species are called **cleistogamous**.

When a pollinator enters an orchid flower, the viscidium comes into contact with some part of the pollinator and promptly sticks to it. When the pollinator leaves the flower, the pollinium, itself connected to the viscidium by the caudicle or stipe, is detached and removed. As the pollinator enters another flower of the same species, the pollinia are positioned such that they stick to the stigma of the second flower, just below the rostellum, thereby effecting pollination.

The production of flowers requires a significant energy expenditure, and it is therefore futile to bloom if there is little or no likelihood of pollination. Flowers accordingly employ various strategies to attract pollinators.

The timing of flowering is coordinated with pollinator activity. Most species flower only once or twice a year, whilst others produce flowers sporadically throughout the year. There are also species in which blooming is triggered by some type of weather event, such as a drop in temperature, a change in atmospheric pressure, or rainfall following a drier spell.

Orchids lure their pollinators by various means. Many provide nectar to entice pollinators, while others use colour, shape, fragrance, or deceit. A common ploy is to mimic the appearance and scent of the females of insect pollinators; for example, the highly specialised flowers of many *Lepanthes*, *Telipogon*, *Trichoceros*, *Ophrys* and many Australian terrestrial species bear an uncanny resemblance to flies, bees or wasps, and even emit pheromones that are highly similar to those of the pollinator species. Another form of mimicry involves closely resembling the flowers of a neighbouring plant. For example, the Australian donkey orchids (*Diuris*) resemble members of the pea family amongst which they often grow and synchronously bloom.

Bright red or orange-coloured flowers are often pollinated by hummingbirds, sunbirds and butterflies; such blooms are usually unscented, tubular in shape, and sometimes have similar, enticing patterns, but offer none of the nectar produced by the flowers they imitate. Moth-pollinated species, such as the majority of tropical African and Madagascan Angraecoid orchids, usually have white or green flowers that are highly fragrant at night, providing visual and olfactory cues for their nocturnal lepidopteran pollinators. Other orchids, pollinated by carrion flies or beetles, go to further extremes; not only do they emit the odour of a decaying corpse, but their fleshy colouration and texture often furthers the deception.

However it is achieved, once an orchid flower is pollinated, it starts to collapse and the ovary begins to swell. It can take a few weeks to nearly a year for an orchid seed pod to form and the seed to mature. Once mature, the capsule dehisces (splits) and the seeds are dispersed. Orchid seeds are minute and can be incredibly profuse; in one documented case, a researcher at Harvard spent considerable time counting the seeds in an individual capsule, determining the number to be more than an astonishing 3.5 million! Most orchid seeds are distributed by wind and air currents, and can travel considerable distances. However, they will only germinate under very particular conditions.

Orchid seeds, unlike those of most plants, have virtually no endosperm, the food source used by young plants following germination that allows the embryo to continue to develop until it has roots and leaves. In order for an orchid to germinate and grow in the wild, the embryo needs to be infected with a mycorrhizal fungus that produces the substances necessary for continued development. Of the thousands of seeds produced, only a tiny number of orchid seeds will find the ideal conditions within which they can germinate, fewer still will find the appropriate mycorrhiza, and of these, only a fraction will survive to maturity. For many orchids, the time from germination to blooming size can be three to seven years.



Figure 1.19 (above) The miniature terrestrial, *Chiloglottis gunnii*, growing *in situ* on Bruny Island, Tasmania, its unique flowers being quite unmistakable. This taxon favours cool, moist, tall forests or shaded, drier, open forests across southeastern Australia. Plants from this genus are readily cultivated given suitable conditions, but they are seldom available outside of Australia, where they are strictly protected.



Figure 1.20 (above) *Corybas dieminicus*, the Stately Helmet Orchid, growing in cultivation. In its native Australia, it favours moist, shaded forests and mountain gullies in the far east of the country. A number of different *Corybas* species are cultivated with great success, their cute flowers, diminutive stature and relatively uniform demands holding great appeal with collectors (Grower: Hanging Gardens).

Plant Habit

There are two basic growth patterns in the orchid family; **sympodial** (conjoined-foot) and **monopodial** (one-foot). Sympodial orchids are those that produce determinate growths, usually on a seasonal basis; such growths terminate in an inflorescence, thus new growths must be produced from secondary buds in order for blooming to occur again, though naturally there are exceptions. Individual growths may consist of pseudobulbs, canes or ramicauls. The rhizomes of epiphytic and lithophytic species can form growths that range from tightly clumping to long-repent. Depending upon the species, the rhizome may grow horizontally or vertically, and the plants may develop in an erect to pendent fashion. Terrestrial orchids are also sympodial, with new growths originating from tubers, tuberoids, tuberous roots, corms, corm-like pseudobulbs, fleshy roots or underground creeping rhizomes. Inflorescences of sympodial orchids may be borne terminally or laterally, although there are again occasional exceptions. In particular, there are four recognised growth habits in the Coelogyninae alone:

- 1) **Heteranthous** the inflorescence is borne on a separate growth that never develops a pseudobulb or leaves
- 2) **Hysteranthous** the inflorescence develops on top of a fully grown pseudobulb with fully developed leaves
- 3) **Proteranthous** the inflorescence emerges prior to the leaves and the pseudobulb remains obscured by the sheaths; after anthesis, the pseudobulb develops leaves
- 4) **Synanthous** the inflorescence develops simultaneously with the emerging leaves; the terminal internode is not yet developed into a pseudobulb.





Figure 1.21 Sympodial Orchid Forms

- (a) clumping (caespitose), *Cattleya* (*Hoffmannseggella*)
- (b) clumping, rhizome slightly ascending, *Dendrobium*
- (c) clumping, rhizome ascending, *Dendrobium* (*Epigeneium*)
- (d) clumping, lacking pseudobulbs, *Phymatidium*
- (e) clumping, persistent bracts, *Bulbophyllum*
- (f) clumping, mat forming, *Trias*
- (g) clumping, mat forming, pseudobulbs much reduced, *Bulbophyllum*
- (h) repent, rooting at base of pseudobulbs, *Bulbophyllum*
- (i) clumping, deciduous, *Epidendrum*
- (j) clumping, rhizome slowly ascending, *Christensonella*
- (k) clumping, rhizome ascending, mat-forming, *Christensonella*
- (l) shortly repent, rhizome ascending, *Masdevallia*
- (m) clumping, lacking pseudobulbs, mat-forming, *Acianthera*
- (n) clumping, mat-forming, leaves alternate along rhizome *Dendrobium* (*Dockrillia*)
- (o) clumping, mat-forming, *Dendrobium* (*Dockrillia*)
- (p) clumping, mat forming, leaves alternate along rhizome, *Dendrobium*
- (q) clumping, with ramicauls, *Masdevallia*
- (r) clumping, fan shaped growths, *Chytroglossa*.



Monopodial orchids grow continuously from a single growing point and bear axillary or lateral inflorescences. The plants of monopodial orchids can be single, but may also branch at the base (most commonly) or anywhere along the stem. They may grow in an erect to pendent fashion. With few exceptions, the vast majority of monopodial orchids belong to the subtribes Aeridinae, Aeranginae and Angraecinae. All naturally leafless orchids are monopodial, belonging to any of the three aforementioned subtribes.

Figure 1.22 Monopodial Orchid forms (facing page)

- | | |
|--|---|
| (a) plant descending leaves falcate, single, <i>Sarcochilus</i> | apex unequally bilobed, <i>Aerangis</i> |
| (b) plant clumping, imbricating leaf bases, leaves two-ranked, linear, <i>Neofinetia</i> | (h) plant slowly clumping, leaves arranged in whorls, fleshy, <i>Angraecum</i> |
| (c) plant pendent, leaves two-ranked, succulent, conduplicate, unifacial, <i>Angraecum</i> | (i) plant pendent, fan shaped, imbricating leaf bases, leaves articulated, <i>Ornithocephalus</i> |
| (d) plant pendent, leaves conduplicate, fleshy, channelled abaxially, <i>Ceratochilus</i> | (j) stem erect, laterally compressed, rooting at nodes, leaves opposite, <i>Angraecum</i> |
| (e) stem erect, leaves opposite, conduplicate, <i>Ascocentrum</i> | (k) plant leafless, clumping, root tips brown, <i>Microcoelia</i> |
| (f) plant erect, slowly clumping, imbricating leaf bases, leaves two-ranked, <i>Schoenorchis</i> | (l) plant leafless, roots growing in a rosette, <i>Chiloschista</i> |
| (g) plant descending, few leaved, leaves leathery, fleshy, punctate, | (m) plant leafless, roots growing in a rosette, flattened, <i>Chiloschista</i> . |



Figure 1.23 (above) A beautiful, hanging mount of the sympodial orchid, *Phymatidium falcifolium*. This clumping species produces fine sprays of flowers when in full bloom (Grower: Brad Cotten).

Roots

The roots of orchids, in common with most plants, serve at least two purposes; they support the plant, and absorb moisture and nutrients. In addition, the roots of most epiphytic and lithophytic orchids also have the ability to photosynthesise. The roots of orchids are secondary, arising from the rhizome, stems, pseudobulbs or other storage units. They vary tremendously in size from string-like to thick and fleshy, can be single or branch freely, are few to many in number, and can be glabrous, verrucose, knotty or hairy (see Figure 1.24). Velamen, an outer layer of highly absorbent cells, is found on the roots of many orchids, but it is most evident on the roots of rock and tree-growing species. When watered, the velamen of these species immediately absorbs moisture, often changing colour to green when wet. The tips of actively growing orchid roots are usually green, but can be brownish or even bright orange in some species.

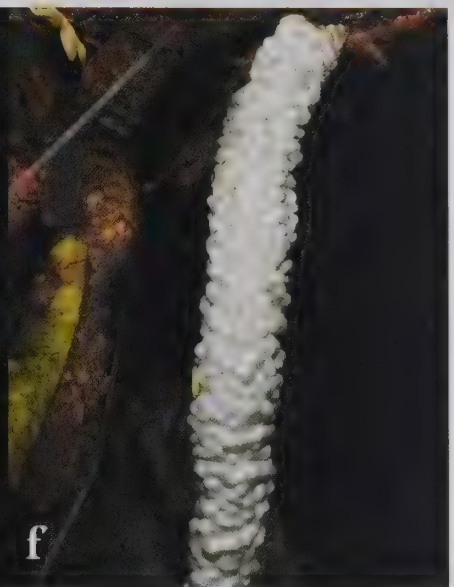
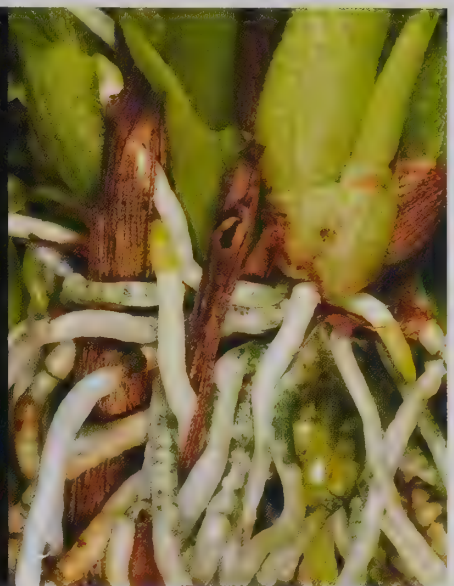
In addition to their supporting roots, a large number of epiphytic orchids have prolific, non-attaching aerial roots that help to absorb moisture and also photosynthesise. Additionally, there are a relatively small number of species that have a further type of aerial root. These tend to be fine, numerous and upward growing, and are thought to play a role in the trapping of debris, detritus and other nutrient-yielding substances; as such, they facilitate nutrient absorption by the plant.

Figure 1.24 Orchid root forms (facing page)

- | | |
|---|--|
| (a) hirsute, <i>Ornithocephalus</i> | (f) verrucose, <i>Angraecum</i> |
| (b) pubescent, <i>Ornithocephalus</i> | (g) green root tips, <i>Telipogon</i> |
| (c) glabrous, fine, thin, <i>Dendrobium</i> | (h) orange root tips, <i>Microcoelia</i> |
| (d) glabrous, thick, fleshy, <i>Amesiella</i> | (i) flattened roots, <i>Chiloschista</i> |
| (e) tuberculed, <i>Microcoelia</i> | |



Figure 1.25 (above) Thin, glabrous, non-attaching aerial roots emerge from a dense, flowering clump of cultivated *Bulbophyllum frostii* 'Ruby Slippers', its spreading growths wholly obscuring the container in which it sits (Grower: Golden Gate Orchids).



Stems

The **rhizome** is a term used frequently in this book; a rhizome is a slowly creeping stem that grows in or on the substrate. In sympodial orchids, secondary growths like pseudobulbs, ramicauls and canes arise from the rhizome. In contrast, monopodial orchids do not have a distinct rhizome.

Pseudobulbs are not true bulbs, but specialised, more or less thickened, usually aerial stems that arise from the rhizome. They function primarily as storage organs and vary significantly in both size and shape. Pseudobulbs may consist of one thickened internode (heteroblastic) or several (homoblastic), and can vary in thickness from cane-like to swollen. They may have papery or fibrous bracts or sheaths that disintegrate or are persistent. Pseudobulbs can range in size from quite large to minute, in shape from round to laterally compressed, tetragonal or multi-angular in cross-section, and they can be suffused with colour, patterned or variably textured (see Figure 1.28). In some species, the pseudobulbs even have small cavities or are hollow; this unusual type of pseudobulb can act as a refuge for aggressive ants. There are a few orchid species in which the pseudobulb is subtended by leafy bracts, bearing only a small, single, residual leaf at its apex. Pseudobulbs may be partially to nearly entirely obscured by leafy bracts. The morphological characters of pseudobulbs are often used in taxonomy. **Canes** are essentially elongated pseudobulbs with multiple nodes. Leaves may be borne along their lengths or distally.

Ramicaul is a term that is applied to the growing secondary stem of orchids of the subtribe Pleurothallidinae; these slender structures have little or no storage capacity and basically serve as the connection between the rhizome and the leaf. Ramicauls can be very short (a few millimetres) to very long (nearly a metre) and are usually enclosed in imbricating, sometimes lepanthiform (apically infundibular) sheaths (see Figure 1.27).



Figure 1.26 (above) The leaves and flowers of *Restrepia echo* emerge from ramicauls covered with imbricating sheaths (Grower: Hanging Gardens).



Figure 1.27 Orchid stem forms (above)

- (a) cane-like stem, *Dendrobium*
- (b) clavate cane, *Dendrobium*
- (c) cane with swollen nodes, *Dendrobium*
- (d) nigrohirsute cane, *Dendrobium*
- (e) tetragonal, pendent cane, *Dendrobium*
- (f) ramicaul, note abscission line, *Acianthera*
- (g) pseudobulb with reduced leaf, and large leafy bracts, *Trichoceros*
- (h) ramicaul covered with imbricating, inflated sheaths, *Restrepia*
- (i) lepanthiform sheaths, *Lepanthes*
- (j) newly emerging growth with lepanthiform sheaths, *Lepanthes*
- (k) plant with long repent/stoloniferous growth habit, *Gomesa* (*Rodrígueziopsis*)
- (l) adventitious plantlet/keiki from apex of ramicaul, *Restrepia*.



Figure 1.28 Orchid pseudobulb forms (facing page)

- (a) subglobose, *Coelogyne*
- (b) elliptic-oblong, *Prosthechea*
- (c) pyriform, *Bulbophyllum*
- (d) pyriform (more or less), *Panisea*
- (e) narrowly ovoid, ribbed, *Brasiliorchis*
- (f) narrowly ovoid, *Cattleya* (*Hoffmannseggella*)
- (g) ovoid, laterally compressed, faintly ribbed, with transverse barring, *Oncidium*
- (h) obovoid, *Coelogyne*
- (i) conical and tetragonal, *Bulbophyllum*
- (j) irregularly ribbed with sharp tubercles, *Bulbophyllum*
- (k) fusiform, *Cattleya* (*Sophranitis*)
- (l) subcylindric, elongate, *Xylobium*
- (m) dorso-ventrally compressed with irregularly-shaped base, *Bulbophyllum*
- (n) conico-ovoid, ribbed, *Dendrobium*
- (o) subglobose, laterally compressed, *Oncidium*
- (p) subtetragonal, oblong, irregularly ribbed, faintly tubercled, *Dendrobium*.

Leaves

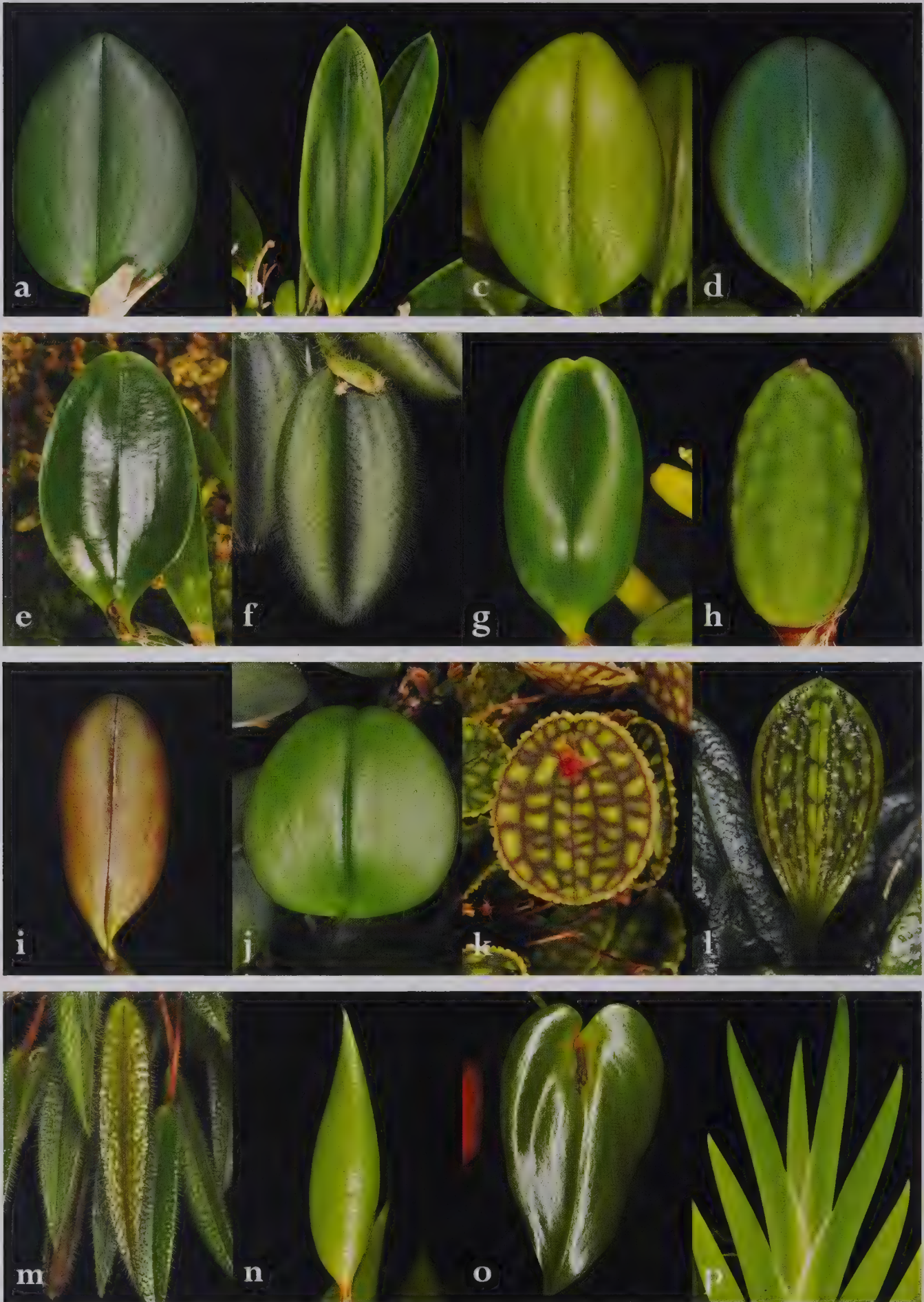
The orchid leaf is a variably shaped, determinate, photosynthetic segment that is borne on the stem, pseudobulb, cane or ramicaul. The leaves of many epiphytic orchids are thick and fleshy, and often bear a hard “skin”, or cuticle, that serves to reduce water loss by transpiration. The majority of terrestrial plants including orchids have structures known as **stomata** present on one or both surfaces of the leaves, and sometimes on other plant surfaces also. Stomata are small pore-like openings that form between pairs of kidney-shaped guard cells in the epidermis. The guard cells open and close the stomata by changing their shape in response to osmotic (turgor) pressure. Stomata are important for gas exchange, in particular the entry of carbon dioxide.

Leaves or leaf-like organs (such as sheaths, scale leaves and leafy bracts) are borne at each node of a stem, with an axillary bud at the base. The leaves of most orchids are typical of monocots, with veins running parallel to the long axis of the leaf, although some species have more pronounced cross venation, appearing variably reticulate. The leaves of most orchids are arranged **distichously**, that is, in two ranks. In this situation, the leaves alternate on opposite sides of the stem. While some pseudobulbs may only produce a single leaf, a careful examination of the scale leaves and sheaths will reveal a distichous arrangement. Some of the more primitive species have a spiral leaf arrangement, and in a few rare instances, two or more leaves may arise at the same level on an internode. Orchid leaves may be unifacial (both surfaces anatomically alike) or bifacial (with anatomically distinct adaxial and abaxial surfaces).

The basal portion of a leaf may be narrowed to form a stalk or **petiole**. In some species, the petiole may be extremely short or ill-defined (**subpetiolate**), or lacking altogether (**sessile**). Orchid leaves vary tremendously in size and shape, both in profile and in cross-section (see Figure 1.29). Many orchids in the tribe Epidendroideae have a special layer of breakaway cells near the base of the leaf, commonly called a joint or articulation. This layer serves as an abscission layer, from which the leaves break away when they die.

Figure 1.29 Orchid leaf forms (following pages)

- (a) ovate (broadly), *Restrepia*
- (b) narrowly ovate, *Cattleya* (*Sophranitis*)
- (c) broadly elliptic, *Pleurothallis*
- (d) broadly elliptic, *Bulbophyllum*
- (e) elliptic-oblong, leaf glossy, *Cattleya* (*Hadrolaelia*)
- (f) elliptic-oblong, leaf pubescent, *Dresslerella*
- (g) oblong, leaf semi-glossy, *Bulbophyllum*
- (h) oblong, leaf verrucose, *Dendrobium* (*Dockrillia*)
- (i) oblong, juvenile foliage with reddish transverse barring, *Bulbophyllum*
- (j) sub-orbicular, *Pleurothallis*
- (k) sub-orbicular, leaf with reticulate pattern, *Lepanthes*
- (l) obovate, leaf verrucose, juvenile foliage with darker reticulation, *Porroglossum*
- (m) ovate-lanceolate, leaf hirsute, semi-glossy, *Dresslerella*
- (n) narrowly ovate, acuminate, *Dendrobium* (*Dockrillia*)
- (o) elongate-cordate, leaf glossy, *Pleurothallis*
- (p) lanceolate, leaf bases imbricating, unifacial, *Dendrobium*
- (q) lanceolate, falcate, pendent, punctate, *Oberonia*
- (r) ligulate, falcate, *Haraella*
- (s) convex, *Lepanthes*
- (t) ovate, leaf papillose, *Dendrobium*
- (u) broadly elliptic, leaf glaucous, *Stelis*
- (v) obovate, leaf verrucose, glossy, *Porroglossum*
- (w) obovate, leaf ventrally suffused with purple, *Masdevallia*
- (x) marginate, ventrally punctate, *Bulbophyllum*
- (y) sulcate, sub-terete, *Leptotes*
- (z) terete, *Scuticaria*
- (aa) imbricating leaf bases, leaves distichous, margins slightly revolute, *Epidendrum*
- (bb) imbricating and articulating leaf bases, *Ornithocephalus*
- (cc) leaf margins serrulate, *Hymenorchis*
- (dd) pleated, ribbed, *Sobralia*
- (ee) pleated, *Sobralia*
- (ff) plicate, *Lycaste*.







Leaves may also feature a seemingly infinite variety of additional distinguishing characteristics, such as patterns, hairs, bristles, depressions, spots, warts, colour suffusion or a glaucous coating (see Figure 1.31). Their margins may also be entire, serrate, erose, denticulate, ciliate or undulate. The apex of an orchid leaf is often characteristic, and thus useful in distinguishing between different species, genera, and in some cases, even subtribes (see Figure 1.30).

Figure 1.30 Orchid leaf apices (above)

- (a) acute, attenuate, apiculate, *Dendrobium* (*Dockrillia*)
- (b) acute, acuminate, apiculate, *Promenaea*
- (c) acute, apiculate, *Leptotes*
- (d) acute, emarginate, *Pteroceras*
- (e) obtuse, *Bulbophyllum*
- (f) obtuse to rounded, *Epidendrum*
- (g) rounded, minute mucronate, *Cattleya*
- (h) erose, *Ascocentrum*

- (i) bilobed (more or less equally), *Angraecum*

- (j) obliquely bilobed, *Aerangis*
- (k) unequally bilobed, *Aerangis*
- (l) unequally bilobed, dentate, *Jumellea*.

- (d) punctate, *Oberonia*

- (e) vermiculate pattern, *Psychopsis* (*Psychopsiella*)
- (f) juvenile foliage suffused with purple, *Dendrobium* (*Dockrillia*)
- (g) fine-spotted, *Trichocentrum*

Figure 1.31 Orchid leaf patterns (facing page)

- (a) dark-spotted, pustulose, *Acianthera*
- (b) reticulate pattern, *Lepanthes*
- (c) reticulate pattern (juvenile foliage), *Porroglossum*

- (h) small spotted, *Acianthera*

- (i) irregularly spotted to blotched, *Phalaenopsis*.



Inflorescence

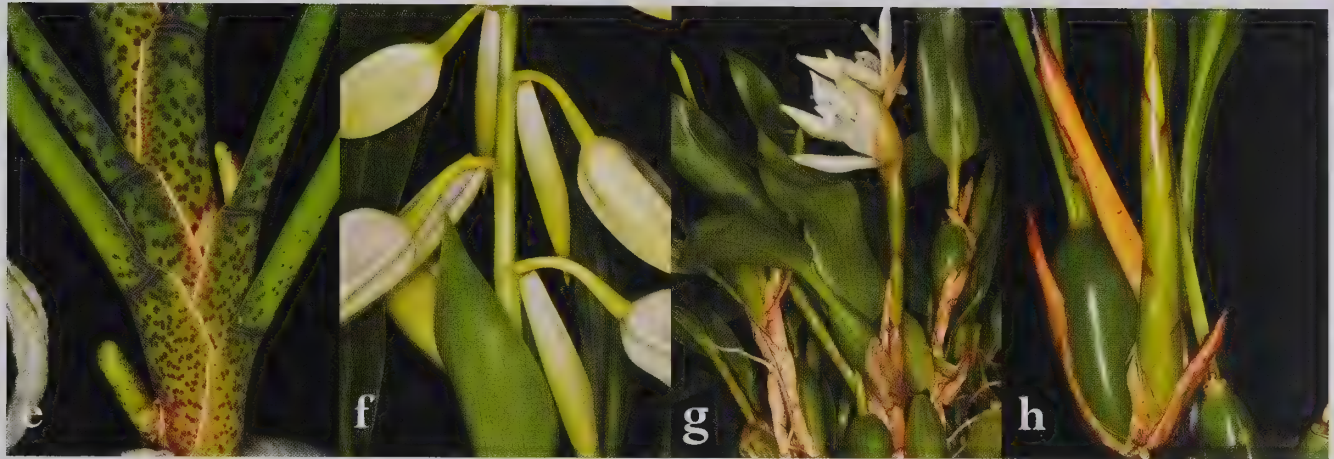
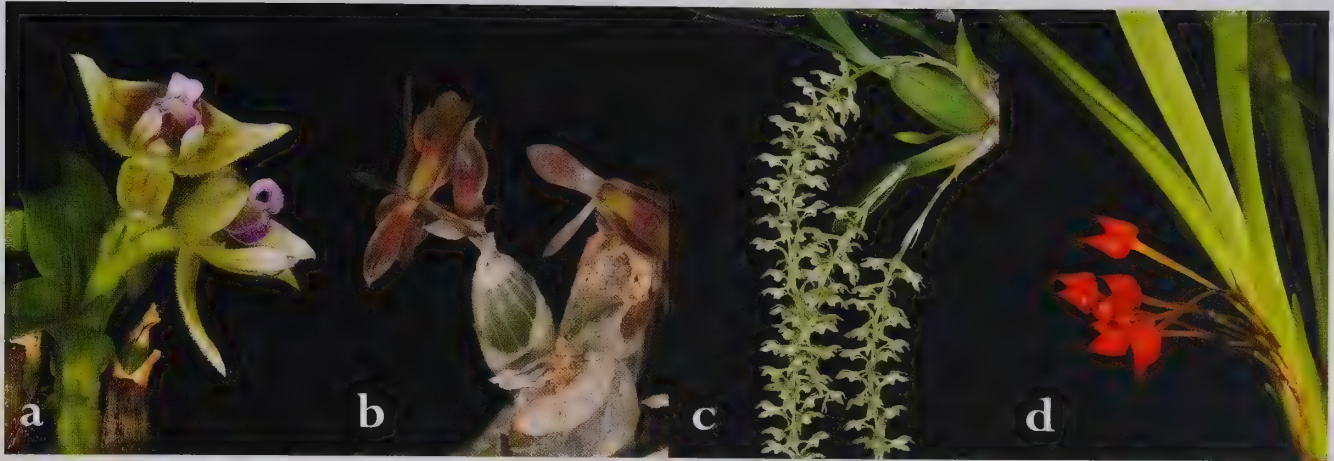
The term **inflorescence** refers to the flower stem and any flowers that it may bear. It is comprised of the **peduncle**, which supports an individual flower or cluster of flowers, and the **rachis**, the portion bearing the flowers. The rachis is distal to the peduncle. An inflorescence that is unbranched is called a **raceme**, whereas an inflorescence with one or more branches is known as a **panicle**. In a raceme, the flowers usually open from the base upwards, although there are exceptions. When the cluster of flowers at the end of the inflorescence forms a flat top with all the flowers at the same level, it is called a **corymb**. Another type of inflorescence is an **umbel**, in which the flower stalks are generally short, equal in length, and spread from a common point, somewhat like the ribs on an umbrella.

In some genera, such as *Restrepia* and *Dresslerella*, flowers emerge from a specialised structure at the apex of the ramicaul on the dorsal or ventral surface of a leaf; this is known as a **fascicle** (in orchid terms, a bundle or cluster from which a succession of single-flowered inflorescences emerge). Flowers emerging from the rachis may be **secund** (all on one side), **distichous** (opposite), **spiralled**, or **whorled**. In all cases, the flower is subtended by a bract, which can vary from inconspicuous to large and prominent. Flowers can be **successive** (opening sequentially) or **simultaneous** (opening at the same time). The peduncle may be partially or wholly covered in sheaths, and the exposed portion can be glabrous or covered with hairs, bristles or warts.

An inflorescence can emerge terminally or laterally from a pseudobulb or ramicaul, or from any nodes in species with canes. The inflorescences of those species with monopodial growth are all axillary, emerging from between the leaves, or lateral, emerging from below the leaves (see Figure 1.32).

Figure 1.32 Orchid inflorescence forms (facing page)

- | | |
|--|---|
| (a) terminal, <i>Polystachya</i> | (k) panicle, <i>Polystachya</i> |
| (b) terminal (from deciduous bulb), <i>Epidendrum</i> | (l) successively flowered panicle, <i>Oncidium</i> (<i>Sigmatostalix</i>) |
| (c) lateral, <i>Gomesa</i> | (m) fractiflex, <i>Chytroglossa</i> |
| (d) lateral (several simultaneous, single flowered), <i>Ornithidium</i> | (n) setulose (bristly), <i>Porroglossum</i> |
| (e) axillary, <i>Holcoglossum</i> | (o) successively flowered raceme, <i>Lepanthes</i> |
| (f) synanthous, <i>Coelogyne</i> | (p) simultaneously flowered raceme, <i>Ornithocephalus</i> (<i>Sphyrastylis</i>). |
| (g) hysteranthous, <i>Coelogyne</i> | |
| (h) proteranthous, <i>Coelogyne</i> | |
| (i) three single-flowered inflorescences from fascicle, <i>Pleurothallis</i> | |
| (j) subterminal, <i>Dendrobium</i> | |



The Habitats of Miniature Orchids and their Conservation

Orchid conservation

With the exception of Antarctica, orchids are found on every continent on Earth, in a range of habitats so rich and varied that it is virtually impossible to describe them all in meaningful detail. Generally, it is the largest orchids that are easiest to spot, but a closer examination of tree trunks, branches, twigs and rock faces will often reveal a diverse selection of miniature orchids as well. Orchids face many challenges against their continued existence in nature. Many of the larger orchid species have been decimated in the wild as a direct consequence of over-collection, whilst miniature orchids are often overlooked. Even so, the greatest threat to the survival of orchid species, as well as most other plant and animal taxa, is the unparalleled rate of habitat destruction.

As the rapidly burgeoning human population continues to expand its range, all remaining natural habitats are increasingly endangered by a seemingly endless list of threats. These include logging, the burning and clearing of land, salinisation, desertification, erosion, ranching, farming, mining, urban sprawl, construction of roads and infrastructure, industrial growth, pollution, misguided or irrational government policies, wars, firewood collection, introduction of non-native plants and animals, climate change and general habitat degradation. Compounding such problems, natural disasters such as hurricanes, typhoons, volcanoes, earthquakes, tsunamis, forest fires and landslides also take their toll. Primary forest, with its high levels of biodiversity and endemism, is disappearing at a frightening and unprecedented pace.



Figure 2.1 (above) Agricultural encroaches high upon the slopes of the Tungurahua volcano, Baños de Agua Santa, Ecuador (Photo: Mary Gerritsen).

Figure 2.2 (facing page) Lowland hill forest clearance has devastated the forest habitat at this site in Vietnam (Photo: Leonid Averyanov).





Figure 2.3 (above) Large scale deforestation in Sabah, Malaysian Borneo. Such clearance takes place on an even greater rate in Kalimantan, Indonesian Borneo, where the spread of oil palm plantations and unregulated cut and burn practices threaten what forest remains (Photo: Mary Gerritsen).

When large tracts of forest are cleared to leave only forest fragments, the organisms that remain within those isolated biomes face additional challenges. Endemic organisms, particularly those with narrow distributions, often have very particular requirements for their survival, and even minor changes to their ecosystem can result in decline and extinction. An erstwhile hot spot of biological diversity was the Brazilian Atlantic Rainforest (Mata Atlântica); today, less than 10 percent of this forest remains, the main having been replaced by cities and towns, coffee plantations, farms, tracts of eucalyptus trees for pulp and charcoal, and countless other developments. The isolation of forest islands by barren land has seen significant declines in species diversity, an issue compounded by the harvesting of remaining plants and animals for food, fuel or trade. This region exemplifies the systematic attack that we are waging on nature worldwide.

The endemic flora and fauna of islands in particular are severely threatened by habitat destruction, and numerous species have already been forever extirpated. The impact of human activities in Madagascar, Borneo, the Philippines, Sumatra and Java has been extreme. Less than 10 percent of Madagascar's forests remain, and an additional 1–2 percent of the remaining forests are disappearing each year. Many islands of the densely populated Philippines have lost over 50 percent of their forest cover. Deforestation and planting of oil palm plantations in Borneo, Sumatra and Java, as well as other islands, has destroyed vast expanses of lowland tropical rainforest. Oil palm plantations have also resulted in enormous loss of lowland tropical rainforest in mainland territories, including Peninsular Malaysia, Nigeria, Kenya, Ghana, Benin and Colombia.

Tropical and subtropical dry forests are also under extreme siege since they are comparatively accessible and more easy to clear and burn than the wetter rainforests. At the time of writing, less than 2–27 percent of the dry forest habitats of Central America, New Caledonia, Madagascar and Mexico remain.

Environmentalists, scientists, naturalists and certain politicians are trying, and in some cases succeeding, to preserve habitats. There are numerous organisations that dedicate effort and monetary support towards the safeguarding of what remains of the world's pristine habitats. Some of these include (alphabetically) Birdlife International, Ceiba Foundation for Tropical Conservation, Conservation International, Global Environment Facility, International Union for the Conservation of Nature (IUCN), Orchid Conservation Alliance, Orchid Conservation Coalition, Rainforest Conservation Fund, World Land Trust and the World Wildlife Fund.

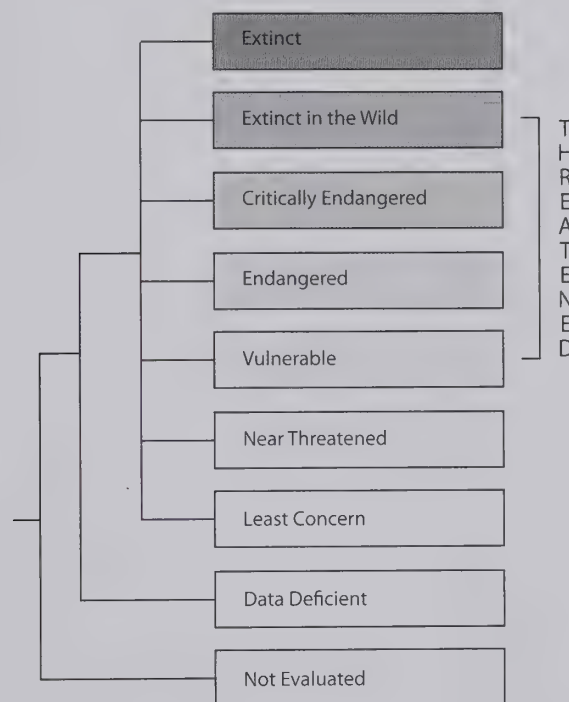
One of the most critical components of habitat conservation is prioritisation, and this demands an understanding of those areas that are most worthy of immediate conservation efforts. This in turn requires natural resource inventories of the natural features, resources, and flora and fauna of the regions that are being considered for conservation. Details of critical habitats and their associated species are usually necessary to convince local, regional and national governments, as well as private organisations, to conserve tracts of land, to recommend and enforce policies, and to implement regulatory protections.

The largest and oldest global environmental organisation dedicated to the conservation of biodiversity is the IUCN, which has over 11 000 volunteer scientists and experts working together under its auspices. The IUCN generated the international standard for species extinction risk, known as the IUCN Red List of Threatened Species. This list has grown in size and complexity from its more modest beginnings, and is currently used to guide conservation activities of many governments and scientific institutions.

The aims of the list are to establish a baseline from which changes in the status of species can be monitored, to provide a global context for the establishment of conservation priorities at the local level, and to monitor, on a continuing basis, the status of a representative selection of species (as biodiversity indicators) that cover the major ecosystems of the world (from www.iucnredlist.org). Species listings and their assessments are provided gratis to the public via the internet.

The IUCN categories, which are assessed according to specific sets of criteria, are as follows (Figure 2.4):

Figure 2.4 (below) The IUCN categories used to indicate the conservation status of taxa assessed using the IUCN Red List criteria.



Extinct:	There is no reasonable doubt that the last individual of the taxon has died.
Extinct in the Wild:	A taxon is extinct in its natural habitat.
Critically Endangered:	A taxon at extremely high risk of extinction in the wild.
Endangered:	A taxon at a very high risk of extinction in the wild.
Vulnerable:	A taxon at high risk of extinction in the wild.
Near Threatened:	Applied to taxa that do not qualify as threatened now, but which may be close to qualifying as threatened.
Least Concern:	Taxa that do not qualify, nor are close to qualifying, as threatened or near threatened.
Data Deficient:	Taxa for which sufficient information is lacking to make a sound status assessment.
Not Evaluated:	Taxa that have not yet been evaluated against the red list criteria.

The criteria upon which assessments are made are:

- a: declining population
- b: geographic range size and fragmentation, decline or fluctuations
- c: small population size and fragmentation, decline or fluctuations
- d: very small population or very restricted distribution
- e: quantitative analysis of extinction risk.

To list a particular taxon in any of the threat categories, only one of the criteria a,b,c,d or e, needs to be met. In this work, the current IUCN listing or equivalent conservation status for a given species is indicated where its inclusion is deemed pertinent.

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between different governments. The intention of CITES was to ensure that international trade in specimens of wild animals and plants does not threaten their survival. It was drafted as a result of a resolution adopted in 1963 at a meeting of members of IUCN, and finally ratified and brought into effect on July 1, 1975. Today, there are more than 30 000 species of plant and animal that are afforded various degrees of protection under CITES. Countries adhere to CITES on a voluntary basis, those that do being known as Parties, and there are currently 177 Parties to CITES. CITES is legally binding on the Parties, but it does not take the place of national laws. Each country must adopt its own domestic legislation in order to implement CITES at the national level. Species that are covered by CITES are listed in three Appendices according to their ascribed degree of protection. Appendix I includes species that are threatened with extinction. Trade in specimens under Appendix I is permitted only under exceptional circumstances. Appendix II includes species that are not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilisation that is incompatible with their survival. Appendix III contains species that are protected in at least one country that has asked other CITES Parties for assistance in controlling trade of that species. If a specimen is CITES listed, it can be imported or exported from a Party to the convention only if the appropriate documents are obtained and presented for clearance at the port of entry or exit. More information about the regulations and their interpretation can be found on the CITES website, www.cites.org.

All orchids are listed under CITES Appendix I or II. Appendix I lists 6 individual orchid species, as well as all of the species in the genera *Paphiopedilum* and *Phragmipedium*. All remaining orchid species are listed under Appendix II. Unfortunately for orchids in the wild, CITES regulations have not protected them. Hundreds of thousands are still collected each year, and illegal commercial trade has continued, sometimes on a large scale. Orchids are smuggled in suitcases and car trunks, in shipping containers, or mailed in deliberately mislabelled packages. Often, a species is misrepresented for something of lesser value on import and export permits, and, probably in more than a few cases, bribes have been known to facilitate the smuggling process. There are also several countries that are not signatories to CITES, and some of these are major markets for smuggled orchids. In many countries, the agricultural inspectors are not sufficiently knowledgeable with regard to various plants, including orchids (let alone able to identify instances of pests and diseases) and how to deal with them during the import process. However, CITES is not implemented in vain; there are a number of cases of orchid smugglers who have been caught, sentenced, jailed and/or issued with large fines. A huge problem with CITES regulations is that while they highly regulate the gathering of wild orchids, they also makes it either illegal or extremely difficult to remove any orchid species, including rare or endangered ones, from habitats that are being destroyed. While there is an allowance in the CITES regulations for this, in many countries government approval is required. In order to obtain authorisation, there is often complicated, time-consuming paperwork to complete, a lengthy period that follows submission before any decision is made, and no guarantee that the application will be authorised. Thus the land is cleared, trees felled, and the orchids long dead before any paperwork can even be submitted, much less approved.

Preservation of habitat is the cornerstone of conservation. Some countries at the forefront of these efforts have set aside vast areas of primary habitat for conservation, with the development of national parks, preserves and other protected natural areas. An outstanding example is the country of Bhutan. In 1995, the government of this tiny Himalayan kingdom ruled that the country must maintain not less than 60 percent of its land area under forest cover, with 26 percent set aside as national parks, wildlife sanctuaries and other protected areas. Costa Rica also has a very ambitious conservation programme, with over 10 percent of the country under some form of protection. In some South American countries, such as Brazil, Ecuador and Colombia, there have been increasing efforts to preserve primary forests and natural areas, but these efforts meet with continual resistance by those with conflicting, usually financial, interests, including oil and mining groups, and even unstable governments.



Figure 2.5 (above) A limestone karst formation demarcates the boundary of an extensive protected area of special scientific interest near Sabang, northern Palawan, that is contiguous with a local UNESCO site. Such biological refuges are vital to the preservation of endemic flora, a fact that is particularly poignant in the Philippines, where less than 3 percent of rainforest cover remains, the most extensive tracts of which may persist on this island (Photo: Alastair Robinson).

In developing countries, the setting aside of protected areas in the absence of economic incentives for preservation has historically failed. Habitat destruction has often continued at an accelerated pace in instances where no means exist to improve the quality of living for the poor, or to deter forest clearing by illegal loggers, mining operators or developers. It is incumbent upon both local peoples and their governments to realise financial returns sufficient to offset the costs of maintaining the parks, but sometimes also the revenue that might have been received from activities such as oil drilling, mining and logging. In essence, success requires reconciliation between the conflicting desire for short term profits and the long term benefits that conservation can generate.

The education of local populations is an extremely important effort, and more durable than many other approaches. Local environmentalists, often with the support of outside conservation organisations, have developed various educational programs for school children and their parents. These programs encourage an appreciation of biodiversity, and with it the preservation of habitat, with the simple goal of encouraging local people to feel proud of their native plants and animals and thus be more likely to actively preserve them. Developing research facilities to train local scientists and guides builds intellectual capital, a vital asset. With it, local scientists can unlock the value of their own natural treasures and turn them into commercial products, including new drugs, foods and materials. This can also provide opportunities for the improvement of the local economies via the development of methods that improve crop yields without further deforestation, mitigate soil erosion, and promote long-term forest preservation. Training local guides provides a means of improving surveillance and patrols of the protected areas, and individuals with a vested interest in the success of the park are more likely to ensure that their source of income is not threatened. Involving the local community in maintaining parks, whether as management, guides, vendors of food and handicrafts or maintenance workers, helps to return much-needed income back to the community.

Eco-tourism is one of the best long-term and sustainable approaches to habitat conservation. Eco-tourists pay to see the natural beauty of a country, not the destruction wrought by short term exploitation, and thus place a monetary value on the preservation of pristine natural habitat. Tourists are becoming increasingly willing and supportive of paying directly for preservation, with park entrance fees, guide fees and direct donations, and it is hoped that this trend will continue to grow. Eco-tourism also helps to create a sustainable economy by providing opportunities for education and training, both of which lead to employment. However, it is important to balance eco-tourism with sustainable infrastructure, such that it does not transition into mass-market tourism which leads to increased hotel and facilities construction, as well as increased vehicular and pedestrian traffic in ecologically sensitive areas. Eco-tourism should not be allowed to overwhelm fragile environments with masses of visitors and the problems that their numbers cause, just some of which include the trampling of trail-side vegetation, leading to further erosion, sewage, litter, casual poaching and increased requirements for clean water and electrical power.



Figure 2.6 (above) Pristine submontane tropical rainforest covers the slopes of Mount Mulanje, Malawi. The area pictured stands at an elevation of approximately 1100 metres above sea level (Photo: Mike Duncan).

Ex situ conservation is a double-edged sword. By definition, this means the protection of an endangered species by relocating it, either to a new habitat in nature, or to artificial habitats under human care. In the case of orchids, this term is often used to describe the artificial propagation and cultivation of species. A misguided interpretation of *ex situ* conservation is often that one is “saving species” by removing rare plants, which is really not the case. Whilst this does mean that plants are propagated for the commercial trade, and therefore relieves some of the pressures placed on wild populations, it denies the native habitat of component taxa that form part of the complex web of species that occupy any habitat; this leads to loss of ecological diversity, as well as the genetic impoverishment of the remaining individuals of a given species, diminishing further its chances of continued survival in the wild forever. Moreover, the reduced collection pressure brought about by artificial propagation does not necessarily eliminate that pressure. For example, enormous quantities of *Dendrobium nobile* are collected for traditional Chinese herbal medicine. Although methods for artificial propagation of this orchid have been developed in recent years, many herbalists believe that only plants collected in the wild have the desired medicinal properties. *Ex situ* conservation not only preserves a tiny fraction of infraspecific diversity, but also it exerts a selection pressure in favour of artificial culture conditions amongst subsequent generations. This inevitably leads to irreversible loss of genetic diversity, the result being reduced robustness in terms of adaptability for survival in the wild.

Habitat restoration efforts are underway in many countries, but it should be borne in mind that it is impossible to restore damaged habitats to their original state. The biologically diverse primary forests took thousands to tens of thousands of years after the last ice age to develop, and it is simplistic and perhaps naïve to think that we are capable of restoring a forest in a few generations. The complex, intricate and bewilderingly interconnected network of organisms, from fungi and bacteria to the animals and plants that make up a primary forest, cannot be simply restored by planting different kinds of trees and other plants. Nonetheless, these efforts are important as they do help to conserve as many of the original species as possible, reduce further erosion and desertification, and help to reduce carbon dioxide levels in the atmosphere. Additionally, forests can eventually come to approximate their former condition, allowing for many species to return provided there are neighbouring patches of remnant forest.

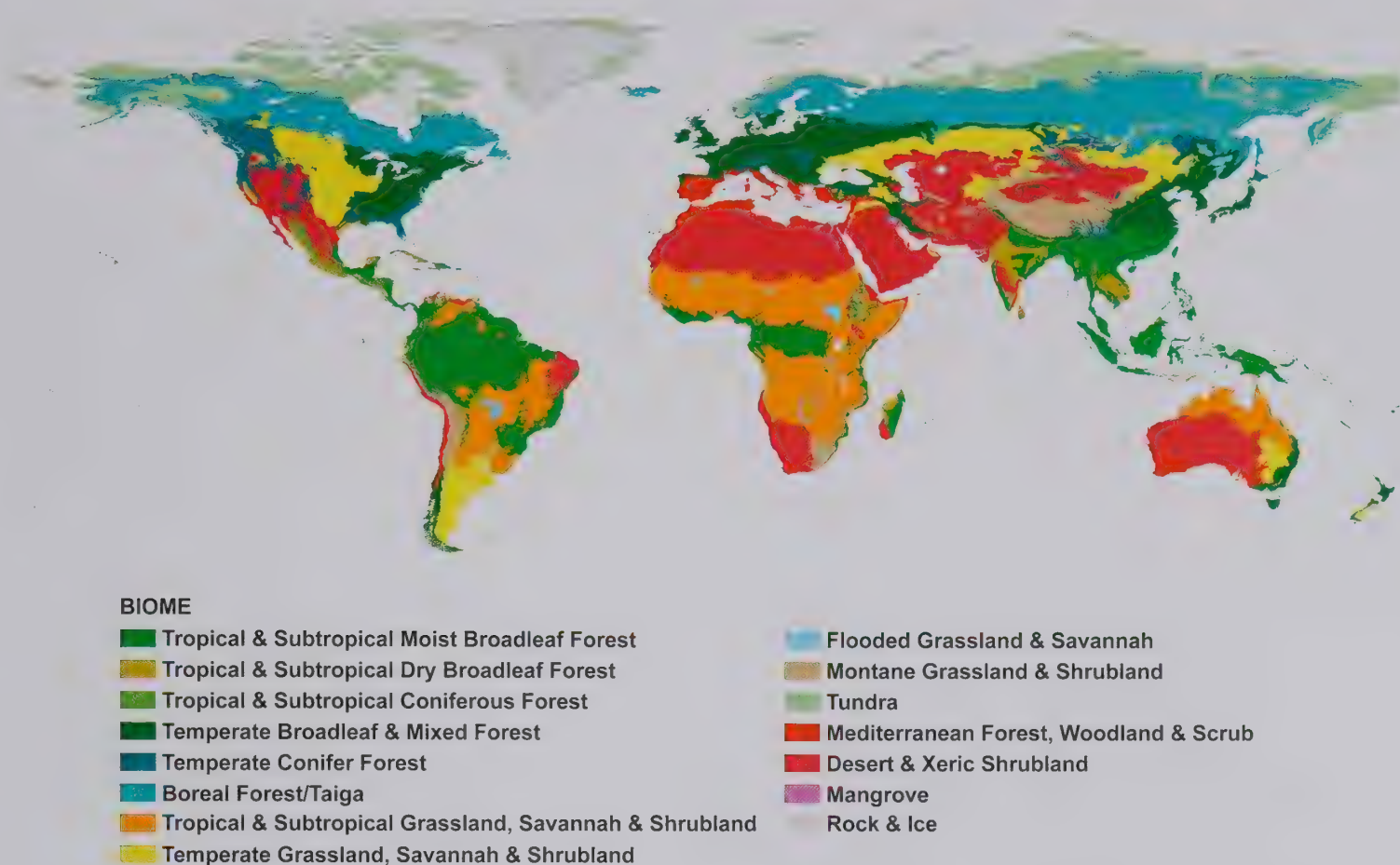


Figure 2.7 (above) A map of the world demonstrating the various types of recognised biome, as well as the ranges that they respectively occupy. Adapted from Olson *et al.* (2001) Terrestrial ecoregions of the world: New map of life on earth. *Bioscience* 51: 933–938.

Habitats of epiphytic and lithophytic orchids

The naturally occurring communities of flora and fauna occupying a major habitat are called biomes, and ecologists recognise a number of different terrestrial and aquatic biomes. These have different designations depending upon the classification system followed. The World Wide Fund for Nature (WWF) developed a classification system with 14 terrestrial biomes, defined by plant structures, leaf types, plant spacing and other factors that include climate, latitude, humidity, seasonal variations in rainfall, elevation, terrain and soil type. The major land biomes are (see Figure 2.7):

- Mangrove forest
- Tropical and subtropical moist broad leaf forest (rainforest)
- Tropical and subtropical dry broadleaf forest
- Tropical and subtropical coniferous forest
- Temperate broadleaf and mixed forest
- Temperate coniferous forest
- Boreal forest/taiga
- Tropical and subtropical grassland, savannah and shrubland
- Temperate grassland, savannah and shrubland
- Flooded grassland and savannah
- Montane grassland and shrubland
- Tundra
- Mediterranean forest, woodland and scrub or sclerophyll forest
- Desert and xeric shrubland

The boundaries between biomes are not precise, and zones of transition between one biome and another often occur. These share the flora and fauna of both ecosystems. Of the aforementioned biomes, several are home to epiphytic and lithophytic orchids. These are discussed further here.

Mangroves

Mangroves are halotolerant (salt-tolerant) trees and shrubs that are found in waterlogged, salty, coastal soils along more than two thirds of the lower river deltas, estuaries and coastlines of the tropical and subtropical regions, generally between the latitudes of 25 °N and 25 °S. Ambient temperatures of mangrove forest tend to be warm (>20 °C), with only small diurnal and seasonal variations in temperature. The relative humidity is high, but lower than that of inland forests. The mud-flats are exposed to full sun during low tides and can become very hot and reflective, whilst under the shade of the mangrove tree canopy, the temperatures are significantly cooler. Areas with mangrove tend to be found along coastal regions that receive high rainfall and heavy run off from inland sources. Of the world's mangroves, tropical Asia has about 42 percent, Africa 32 percent and North and Central America 15 percent. Mangroves are also found in northern South America, the northern part of the Persian Gulf, northern and eastern Australia, in New Guinea, northern New Zealand and various Pacific Islands. Mangroves have a distinctive appearance, with a prop-like tangle of roots that give the trees the appearance of standing on stilts above the water. Daily tidal movement means that the tangled, sediment-trapping roots are flooded once or twice a day, helping to shore up the muddy bottom; when exposed at low tide, the roots conduct necessary air exchange, as the soils are soft, waterlogged and oxygen poor. A typical mangrove usually features a limited number of tree species adapted to the challenging, salty environment, but the trees themselves create a rich ecosystem for many other organisms, both in the water and above. Most mangroves are a “closed forest” with a heavy, continuous leafy canopy



Figure 2.8 (above) An open area of coastal mangrove within the Bako National Park in Sarawak, Borneo. Such stands are home to highly specialised flora and fauna (Photo: Mary Gerritsen).

covering. The canopy of the mangrove can be a rich habitat, supporting various species of bromeliad (in the Neotropics), orchid, fern, and other epiphytes, as well as many animal species, particularly birds and winged insects. Mangrove forests are involved in a number of critical roles, including coastline stabilisation, natural filtration, buffering against waves, and as a nursery for many marine organisms. Mangrove forests are critically threatened by coastal development, climate change, logging and agriculture. Currently, a staggering 11 out of the 70 known mangrove species have been placed on the IUCN red list, and at least two species, *Sonneratia griffithii* and *Bruguiera hainesii*, have a high probability of extinction.

Tropical Moist Evergreen Broadleaf Forest

Tropical evergreen broadleaf forests encircle the equatorial regions, generally between the Tropics of Cancer and Capricorn. The forests are dominated by evergreen and semi-evergreen tree species. This type of forest is the most biodiverse of any terrestrial habitat type, and the perpetually warm, wet climate fosters rich and explosive plant growth. This major habitat type can be subclassified into a large number of ecoregions (50). The most biodiverse of these are the Western Arc forests of the Amazon Basin, the Atlantic Rainforest of Brazil, the Choco-Darien region of southernmost Central America and northwestern South America, and the Peninsular Malaysia and northern Borneo forests. Other regions of tropical moist evergreen forest with high biodiversity include the montane forests of the Northern Andes and the forests of the Guiana region. Various types of such forest can be distinguished.

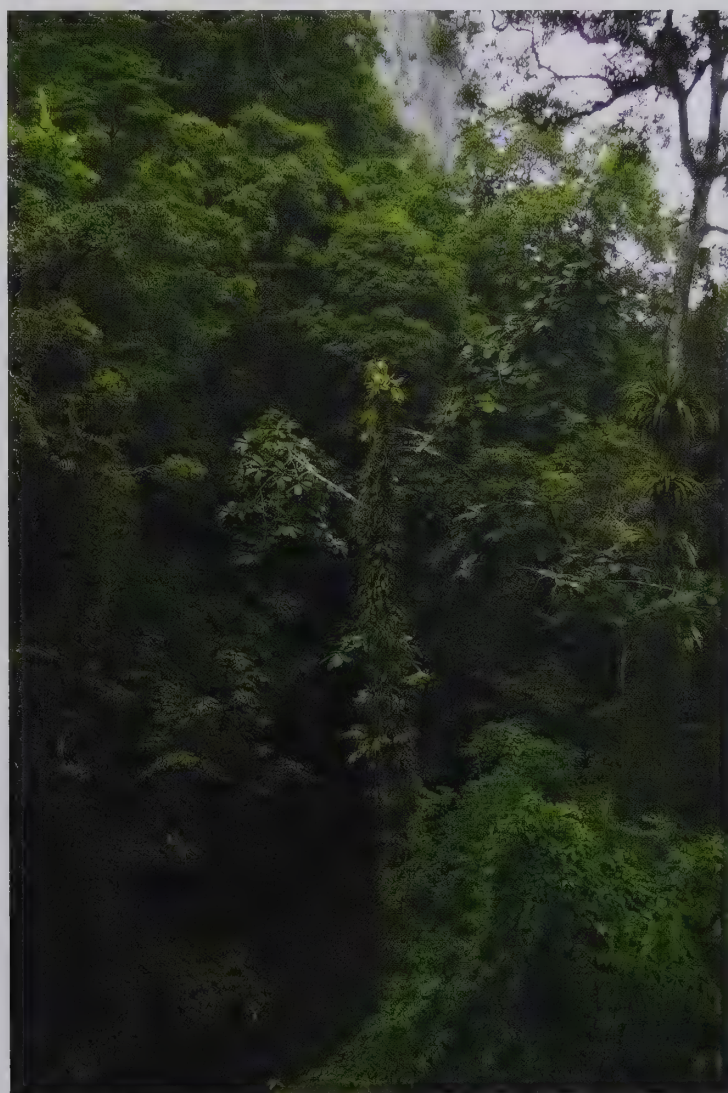


Figure 2.9 (above) Lowland tropical rainforest flanks the Melinau limestone formation in the extensive Mulu National Park, Sarawak, Borneo (Photo: Mary Gerritsen).



Figure 2.10 (above) Tropical montane rainforest in Costa Rica. The rich growth of epiphytes in such regions includes innumerable orchid taxa (Photo: Daniel Jimenez).

Restinga is a Portuguese word that describes the relatively short (5–15 m in height), coastal, tropical and subtropical moist broadleaf forests that grow on stabilised sand dunes in coastal Brazil. The soils tend to be acidic, sandy and nutrient poor. These are typically open, savannah-like forests with clumps of trees and shrubs, as well as various species of herb, grass and sedge. There are two regions of restinga distinguished in Brazil. The Atlantic Coast restinga is found in patches along the eastern coast, in the states of Rio Grande do Norte, Bahia, Rio de Janeiro, Santa Catarina and Rio Grande do Sul. The flora of this region shares affinities with the humid Atlantic Rainforest (Mata Atlântica). The northeastern restinga occurs along the coasts of the states of Maranhão, Piauí and Ceará. Here, the flora and fauna are more closely related to those of the moist Amazonian forests. The restinga habitat is not homogeneous, and can have considerable diversity due to differences in local topography and environment. For example, in some areas there are two “cords”; the internal cord next to lagoons, and an external cord next to the sea. The internal region tends to be more humid than the adjacent, drier, external area.



Figure 2.11 (above) Restinga habitat, near sea level, in the state of Rio de Janeiro (Arraial do Cabo), Brazil. (Photo: Ron Kaufmann).

Swamp forests are found in the Niger Delta, in parts of Borneo, Eastern and Western Congo, Sumatra, the Orinoco Delta of Venezuela, southern and northern New Guinea, Peninsular Malaysia and the Tonle Sap-Mekong region of Vietnam. This type of forest is often found along the lower reaches of rivers and surrounding tropical lakes; it is typically flooded with fresh water, either on a permanent or a seasonal basis. **Tropical peat forests** are a special type of swamp forest found in Indonesia, Malaysia and Papua New Guinea, with small regions also found in Vietnam, the Philippines and Thailand. The forests are dominated by dipterocarps (trees of the family Dipterocarpaceae), with many of the trees having buttress or stilt roots. The soils here are low in nutrients, very acidic and often seasonally flooded. The leaves of these trees have numerous chemical defences to prevent decay and nutrient leaching, and debris builds up over time to create a thick layer of peat. However, many of these forests are rich in flowering plant species. The **varzêa** is a type of freshwater swamp forest that occurs in the Amazon Basin of Brazil. These forests are also seasonally flooded.

Kerangas forests are a type of tropical moist forest found in Borneo, as well as on some of the neighbouring Indonesian islands. This is a type of heath forest that grows on sandy, acidic soils that are often very nutrient-poor. Kerangas forests are often very rich in orchids, but also carnivorous plants such as *Nepenthes*, *Drosera* and *Utricularia*.



Figure 2.12 (above) A coastal kerangas swamp near Gunung Gading National Park, Sarawak, Borneo. Such habitats are rich in orchids, but also carnivorous plants such as the tropical pitcher plant, *Nepenthes*. An aerial pitcher of *Nepenthes rafflesiana* hangs in frame at the top-right of this image (Photo: Stewart McPherson).

Lowland evergreen rainforests, also known as **tropical rainforests**, receive high rainfall throughout the year. These rainforests experience little variation in temperature or day length and occur in equatorial regions. The largest areas are found in the Amazon Basin of South America, in the Congo Basin of Central Africa, and in Indonesia, Malaysia and Papua New Guinea, generally on flat terrain at elevations below 1000 m. These forests, which have a well-developed canopy “tier” of vegetation, consisting of up to 5 or more layers, are usually taller and more diverse than the higher montane forests. The top layer consists of scattered, very tall trees that tower above the closed canopy layer formed by the crowns of shorter trees. At the ground level there is very little light and relatively few plant species. Tropical rainforests have more species per hectare than any other type of forest, but they are highly endangered, particularly in West Africa, Central America and South-East Asia. Logging for valuable timbers such as mahogany, teak, rosewood and okoumé, as well as burning and clearing for oil palm plantations, pose severe threats to these forests. Mining for precious metals and drilling for fossil fuels are also responsible for severe deforestation. Tropical rainforests now cover approximately 6 percent of Earth’s land area, an area less than half of what they covered just a few years ago.

Tropical montane forests grow on mountains, and there are several defined zones of montane forest that describe these habitats. Tree height has been used as one means of classifying the different types of montane forest. For example, the lowland rainforests have trees as high as 45 m. As elevation increases, the trees become shorter; the trees of lower montane forest grow to ~30 m; to ~20 m in lower montane cloud forest, to ~12 m in upper montane cloud forest, and to ~6 m in subalpine cloud forest. **Lower montane** forest may also be called **submontane forest**. The transition from lower to upper montane forest coincides with the level of cloud formation; interestingly, at this transition zone, the composition and overall appearance of the forest changes dramatically. The leaves of the trees become smaller and harder, and twigs, branches, stems and vines are decorated with mosses, lichens, liverworts and ferns, as well as numerous other epiphytes including bromeliads (Neotropics), gesneriads and orchids. Mosses also cover the



Figure 2.13 (above) An epiphyte laden branch in remnant tropical montane forest, Costa Rica (Photo: Daniel Jimenez).

Figure 2.14 (below) A remnant forest tree in Ecuador is almost wholly obscured by epiphytic taxa from various families (Photo: Mary Gerritsen).

Figure 2.15 (facing page, above) Moss covered cloud forest with *Clusia*, near Banos, Ecuador (Photo: Lou Jost).

Figure 2.16 (facing page, below) Open, mossy, mid-montane ridge forest in Sabah, Borneo (Photo: Mary Gerritsen).

rocks and fallen trees in these forests. **Upper montane forest** may also be called **cloud forest**. There is significant variation in the altitude where cloud forests occur, depending on latitude, local geography and climate. For example, in large inland mountain systems such as the Andes, the cloud forests are typically found at elevations of 2000–3500 m. In coastal regions, cloud forests may be found in the region of 800 m (e.g. Mt. Santubong, Sarawak, Borneo) to 1000 m (e.g. northern Venezuela) elevation, and on some small islands with very steep mountains, they may occur at elevations as low as 500 m (e.g. Gau in Fiji). The lower boundaries of cloud forests tend to be found higher on the drier and more protected leeward slopes, compared to those on the windward slopes. Cloud forests receive much of their moisture from mist and fog that rise up from the more moist and humid lowlands.





Many indigenous peoples have names for such forests, some of which generally mean “the forest that catches the clouds”, which is precisely what these forests do. Cloud forest trees are typically shorter than those of any lowland forest, but they are often heavily burdened with epiphytes that thrive in this highly humid habitat. Tree height on the leeward slopes tends to be higher than those on even nearby windward slopes, and trees on the exposed ridges of windward slopes are shorter still. Cloud forest canopy trees often have gnarled trunks and branches with dense, compact crowns and thickened, hard leaves. The soils here are wet, frequently waterlogged, and high in organic content. The topsoils are peaty and acidic, and may accumulate high levels of phytotoxic elements, such as aluminium, that can inhibit nutrient uptake and contribute to reduced plant stature. This is especially true of **ultramafic** peaks (e.g. Mt. Kinabalu, Borneo, and Mt. Victoria and Mt. Mantalingahan, Palawan), where high soil concentrations of heavy metals, including iron, magnesium and nickel, not only cause severe stunting of pre-summit and summit vegetation, but also exert strong selection pressures for specialism that lead to high levels of endemism.

Figure 2.17 (left) *Casuarina* trees punctuate the foreground in this lower montane tropical forest scene on the island of Mindoro, Philippines. Mindoro is located between the Sunda-shelf affiliated Palawan island and its northern neighbour, Luzon, and as such it has floral characteristics of both islands. The long term isolation of Mindoro from both Luzon and Palawan by deepwater channels has led to very high levels of endemism.

Figure 2.18 (below) A view towards the Narra lowlands and Mount Sagpaw, the highest point of the ultramafic Mount Victoria Massif, the largest contiguous ultramafic terrane on the island of Palawan, Philippines. Despite the comparatively low altitude of this vantage point from the top of “The Teeth” (a double peak of 1726 m elevation), the harsh ultramafic soil, apparent in the foreground towards the right, means that the vegetation ranges in height from just 30 cm to 1.4 m in sheltered areas. Descending towards the connecting ridge in the middle ground, where topography provides both shelter from the wind and areas for the accumulation of humus, the canopy may rise to 2.5 m. Levels of plant endemism are extraordinary, and miniature orchid taxa documented here during short surveys include species of *Bulbophyllum*, *Microsaccus*, *Stigmatodactylus*, *Cryptostylis* and mycoheterotrophic *Tropidea* (Photo: Alastair Robinson).



Cloud forests in general also tend to have many endemic species since they are often geographically isolated from other forests by distance, elevation, soil types and other factors. The abundance and diversity of orchids is also greatest in cloud forests. On Mt. Kinabalu (Borneo), for example, there are over 1000 species of orchid, the majority of which are found in the cloud forest zone. Other names for cloud forest include **mossy forest**, **fog forest**, **upper montane rainforest**, **bosque nublado**, and the **yungas** (Bolivia). **Subalpine cloud forests** are characterised by trees of low stature, gnarled appearance, tiny leaves, and relatively few epiphytes. These are usually encountered only on high mountains, mostly in Central and South America, and Papua New Guinea. This subtype of cloud forest may also be called **elfin forest** or **dwarf cloud forest**. In Mexico, **mesophytic forests** (a type of subtropical humid vegetation) are regarded as a type of cloud forest due to their high relative humidity, with mists present for much of the year. These highly threatened forests are rare, covering only 0.07 percent of Mexico's land area. Cloud forests are under siege worldwide; in Colombia, it has been estimated that as much as 90 percent of cloud forest habitat has been destroyed and replaced by pastures, coffee plantations and other agriculture. Harvesting for firewood and charcoal, introduction of alien species, air pollution, global climate change and plant collection are all serious threats to these extremely important ecosystems.

Tropical and subtropical dry forest

These forests are found north and south of the equatorial forest belt, between 10–20 °N and 10–20 °S. The tropical dry forests are found in the Caribbean, much of western Mexico, the Pacific coast of Central America, northeastern Colombia and Venezuela,



Figure 2.19 (above) The Nanchititla waterfall cascades from amongst seasonal subtropical forest in the Parque Estatal Sierra de Nanchititla, state of Mexico, Mexico. This image was taken in the month of October, during the wet season. (Photo: Dennis Szeszko).

eastern Bolivia, central Brazil, the northern Andean valleys, coastal Ecuador and Peru, southeastern Africa, the Lesser Sunda islands, central India, Indochina, northern Australia, western Madagascar and New Caledonia (see Figure 2.7). Temperatures tend to be warm year round. These forests may also be called **moist deciduous** or **semi-evergreen seasonal forest**. Whatever the term, tropical dry forest can be defined as forest in a frost-free region with annual precipitation of 500–2000 mm, and with a dry season that ranges between 4 and 7 months in length. During the dry season, there is generally less than a total of 50 mm precipitation. It is the prolonged period with absent or much reduced precipitation that characterises dry forest. The animals and plants found here have specific adaptations that allow them to survive the dry season. The trees are predominantly of a deciduous nature; during the dry season they undergo a leafless period of variable duration depending on the region and species in question. Plants lose moisture through their leaves, thus shedding them helps them to conserve water. When leafless, the trees enable more sunlight to reach the ground, as well as the epiphytes amongst their branches. Many other plants, including some orchids, shed their leaves during the dry season, though some plants may continue to photosynthesise through their roots, as in *Chiloschista*. Orchids from these habitats tend to have additional dry season adaptations, including leathery or even reduced pseudobulbs, leaves that are often much reduced, narrow, sometimes terete, thickened, hard, leathery, succulent, or with a waxy coating, and roots that are proportionately large and thickened. During the dry season, most plants, including orchids, remain dormant, drawing on stored water to survive until the rainy season. Microclimates with higher humidity, as found along water courses or in steep gullies and ravines, often have more orchid species than drier, adjacent areas; these are called **riparian** or **riverine** habitats. In Mexico, another word used to describe



Figure 2.20 (above) The same view of the Nanchititla waterfall, but taken in May, during the dry season when water is scarce (Photo: Dennis Szeszko).

a similar habitat is **barranca**, a narrow winding river gorge. In South America, these are called **quebrada**. In some regions, while there is little or no precipitation during the dry period, high humidity or nightly fog and condensation provide a source of moisture to epiphytic (e.g. *Drymoda siamensis*, *Isabelia violacea*) and lithophytic species (e.g. *Jumellea densefoliata*). Orchids growing in this type of habitat often receive greater amounts of light during the dry season than they do throughout the rest of the year.

Unfortunately, tropical dry forests are easily converted to pasture through logging and burning. As a consequence, very few of these dry forest types remain, particularly in regions with fertile soil and flat terrain. The introduction of exotic species, both plant and animal, has further endangered what habitat remains. In Central America, the devastation has been severe, the remaining area now estimated at less than 0.1 percent. Many of the organisms, including orchids, that were once common in these forests are now highly threatened, and in many cases verge upon extinction.



Figure 2.21 (above) Tropical dry forest, Department of Sacatepéquez, Guatemala, at an elevation of 1400 m (Photo: Gary Yong Gee).

Tropical and subtropical savannah

Savannah (or savanna) is a type of grassland ecosystem. Trees are relatively small and generally widely spaced, such that there is not a continuous canopy. This allows high light levels to reach the ground, permitting the proliferation of grass species. In some savannahs, tree density can be quite high, although the trees tend to be regularly spaced. The majority of rainfall in savannahs is confined to one season, and savannahs are often found as a transitional zone between forests and deserts, or forests and open grasslands. In South Africa, savannah is known as **veld** or **veldt**. In Venezuela and Colombia, it is known as **sabana** or **llanos**, and in Brazil, Paraguay and Bolivia, the higher savannahs of the central plateau are known as **cerrado**. The cerrado is one of the richest of all tropical savannahs, with a very high degree of endemism. Various tropical and subtropical savannahs are also found across the horn of Africa (Eritrea,

Ethiopia, Kenya, Somalia, Sudan), eastern and central Africa (Tanzania, Uganda, Angola, Botswana, Burundi, Democratic Republic of Congo, Malawi, Mozambique, Namibia, Zambia, Zimbabwe, Cameroon, Central African Republic, Chad, Nigeria), northern Australia and the island of New Guinea, Bangladesh, Bhutan, India and Nepal. Savannahs are generally characterised by hot, dry days with much cooler nights. Humidity is higher along water courses, and this is often where the highest density of orchids occurs. During the dry season, fires are quite common, although they are often set by humans. Most of the fires do little damage to mature trees, but high mortality amongst tree seedlings prevents the formation of a continuous tree canopy. The introduction of non-native herbivores, such as cattle, goats and sheep, to savannah woodlands also reduces the undergrowth and tree seedlings, and leads to severe soil degradation due to compaction and erosion. Large expanses of the Australian and South American savannah have also been cleared for pasture, and the introduction of exotic plant species threatens the remaining native plants of these regions.

Some savannahs can be flooded seasonally, or year round in some cases; these are called **flooded savannahs**. The Pantanal (**pântano**) is an example of a flooded savannah, and up to 80 percent of the land is submerged during the rainy season. The Pantanal is found in Brazil and parts of neighbouring Bolivia and Paraguay.



Figure 2.22 (above) Sub-páramo habitat at approximately 3500 m elevation, Pichincha, Ecuador (Photo: Mary Gerritsen).

Montane savannahs are found at high elevations. The most extensive areas occur in the Neotropical **páramo** of the Andes mountains. Páramo refers to an alpine tundra ecosystem type that occurs above the tree-line, but below the permanent snow-line. The typical vegetation is treeless and comprised mostly of tussock (bunch) grasses, dwarf shrubs, sedges, cushion plants and mats of lichen and moss. Páramo habitats often have a high degree of endemic flora and fauna. There are also páramo type ecosystems in Costa Rica, in the Talamanca Mountains. In Colombia and northern Ecuador, the páramo tends to be constantly humid, with some

areas receiving over 2000 mm of precipitation per year. In contrast, the páramo habitats of Venezuela, northern Colombia and Costa Rica have a distinct dry season, while those of southern Ecuador and Peru can experience periods of extreme dryness. The climate of the páramo is generally characterised by wide daily fluctuations in both temperature and humidity; in some cases, there is a daily freeze and thaw cycle. **Subpáramo** is a term sometimes used to describe the transition zone between cloud forest and páramo, and this is characterised by small trees, shrubs and dwarf bamboo. Montane savannah can also be found in the mountains of eastern and central Africa, on Mt. Kinabalu (Borneo), parts of the Western Ghats in South India, and the Central Highlands of New Guinea. Despite the high elevation of these habitats, the effects of increased human populations, mining and associated habitat degradation, as well as agriculture, have destroyed and continue to threaten large areas of montane savannah. The various consequences of global climatic change also take their toll on these fragile ecosystems.

Additional habitats of epiphytic and lithophytic orchids

Sclerophyll forests can be either a specialised type of savannah or a dry tropical forest; in Australia these are often called **heathlands**. Sclerophyll is a term used to describe a specific type of vegetation with hard (*sclera*) leaves (*phyllon*) and short distances between the leaves along the stem. These types of forests are found in western, eastern and southern Australia, in New Caledonia, in the Mediterranean Basin, California's woodlands, the Chilean Matorral, and Madagascar and the Cape Province of South Africa. In Australia, sclerophyll forest occurs in both savannah and dry tropical forest habitats. The soils are typically low in nutrients and high in toxic compounds, often from the leaf litter. Rainfall is seasonal and quite variable. Sclerophyll forests that are home to epiphytic and lithophytic orchid taxa are only found in eastern Australia, New Caledonia and parts of Madagascar.



Figure 2.23 (above) Wet sclerophyll forest with some warm temperate rainforest, Rowley's Rock, New South Wales, Australia.

Figure 2.24 (facing page) Warm temperate rain forest on bottom and sides of cliffs, wet sclerophyll with some rainforest species in the understory on the top of the hills. Ellenborough Falls, New South Wales.





Coastal tablelands are fairly flat regions at somewhat lower elevations found near to the coasts. The habitats can be varied, ranging from tropical lowland rainforest, dry tropical forest, sclerophyll forest to savannah. In Brazil, the coastal tablelands extend from the state of Amapá, in the north, to the state of Rio de Janeiro, in the southeast. In northern Queensland (Australia), there is a large, undulating plateau known as the Atherton Tableland; this fertile plateau has been largely converted to agriculture, although a few remnant patches of the original rainforest remain, while in other more inland areas, sclerophyll forest still persists. The extent of the rainforest is primarily dictated by rainfall, which diminishes rapidly from the coast towards the inland areas, transitioning into sclerophyll forest.



Figure 2.25 (above) The lithophyte encrusted summit of the inselberg of Sierra da Piedade, Minas Gerais, Brazil (Photo: Alek Zaslawski).

Rocky outcrops and **cliff faces** can be biological hotspots, supporting often unique biotic communities with a high degree of endemism. Rock outcrops are often rich in orchids. For example, Lan Hin Taek (Broken Rock Field) in Phu Hin Rongkla National Park, Thailand, is virtually encrusted with orchids, including *Epigeneium amplum*, *Eria pannea*, *Phalaenopsis pulcherrima*, *Otochilus fuscus*, *Thunia alba*, and numerous species of *Bulbophyllum*, *Coelogyne*, *Eria* and *Luisia*, among others. Rocky outcrops in eastern Australia are home to many different orchids, including *Dendrobium*, *Bulbophyllum* and *Sarcochilus* species. **Inselbergs** are a specialised type of rocky outcrop defined as isolated hills, knobs or small mountains that arise abruptly from a lower, often flat area. Even when they

Figure 2.26 (facing page, above) Tropical forest and the soaring cliffs of Mt. Roraima from 2100 metres, Bolivar State, Venezuela (Photo: Mary Gerritsen).

Figure 2.27 (facing page, below) Atlantic rainforest, view from a ridge in Macae de Cima, Rio de Janeiro state, Brazil, at an elevation of approximately 2000 metres (Photo: Mary Gerritsen).

occur in groups, they are still isolated from one another, akin to islands. These insular, isolated habitats are found in most vegetation types and climatic zones of the world. In the tropics, inselbergs are hot spots of plant and animal diversity noted for their unique, often highly specialised flora. This can include orchids, succulents, carnivorous plants, caudiciforms and other xeric species. In southeastern Brazil, there are many inselbergs and nearby granite outcrops that are home to numerous rupicolous orchids. Inselbergs are also found in Madagascar, where they are the habitat of many orchids, including the miniature *Angreacum rutenbergianum*, and the larger *A. sororium*, *A. magdalenae*, *Jumellea ibityana* and *J. rigida*. In Gabon, Equatorial Guinea and Cameroon, various *Polystachya* species are found on inselbergs. Orchids in these rocky environments can grow directly on the rock itself, or in shallow ledges, crevices, cracks and depressions that hold more moisture than the bare rock does. Other orchids grow amongst the roots and stems of associated vegetation that has colonised the rocks. For example, plants in the Velloziaceae (e.g. *Vellozia*, *Nanuzia*, *Barbacenia*) colonise rocky outcrops in Brazil, where a number of orchids grow on the woody stems and amongst the roots of these plants. The flora and fauna of inselbergs, cliff faces and other rocky outcrops are relatively secure, but are still threatened by fires, quarrying, plant collectors and recreational activities such as rock climbing.

Human-influenced (anthropogenic) orchid habitats are one of the few areas where man's activities have possibly created a habitat for some local orchid species. Remnant trees in pastures or paddocks are found at many different elevations, and these are often rich in epiphytic species, particularly those that prefer brighter conditions. Wooden fence posts, power lines and the roofs of houses and other wooden buildings are often colonised by various epiphytic and even a few terrestrial species. Road cuts, particularly in higher elevation areas, are another man-made refuge to many epiphytic and terrestrial orchids that thrive in these disturbed, relatively bright and airy situations. In fact, some genera, such as *Sobralia* and *Phragmipedium*, can be particularly abundant along road cuts in different parts of tropical and subtropical South America. Miniature orchids are often found growing on and amongst roadside rocks and rock faces, steep clay banks, and on small shrubs and tree branches nearby. A perhaps unexpected habitat for orchids are cultivated crop trees such as guava, citrus, mango and coffee; here, the species encountered are often diverse and surprisingly profuse. In many areas, locals believe that the orchids on their trees are parasites, and strip the plants from the trees, feeding them to their livestock or even burning them.

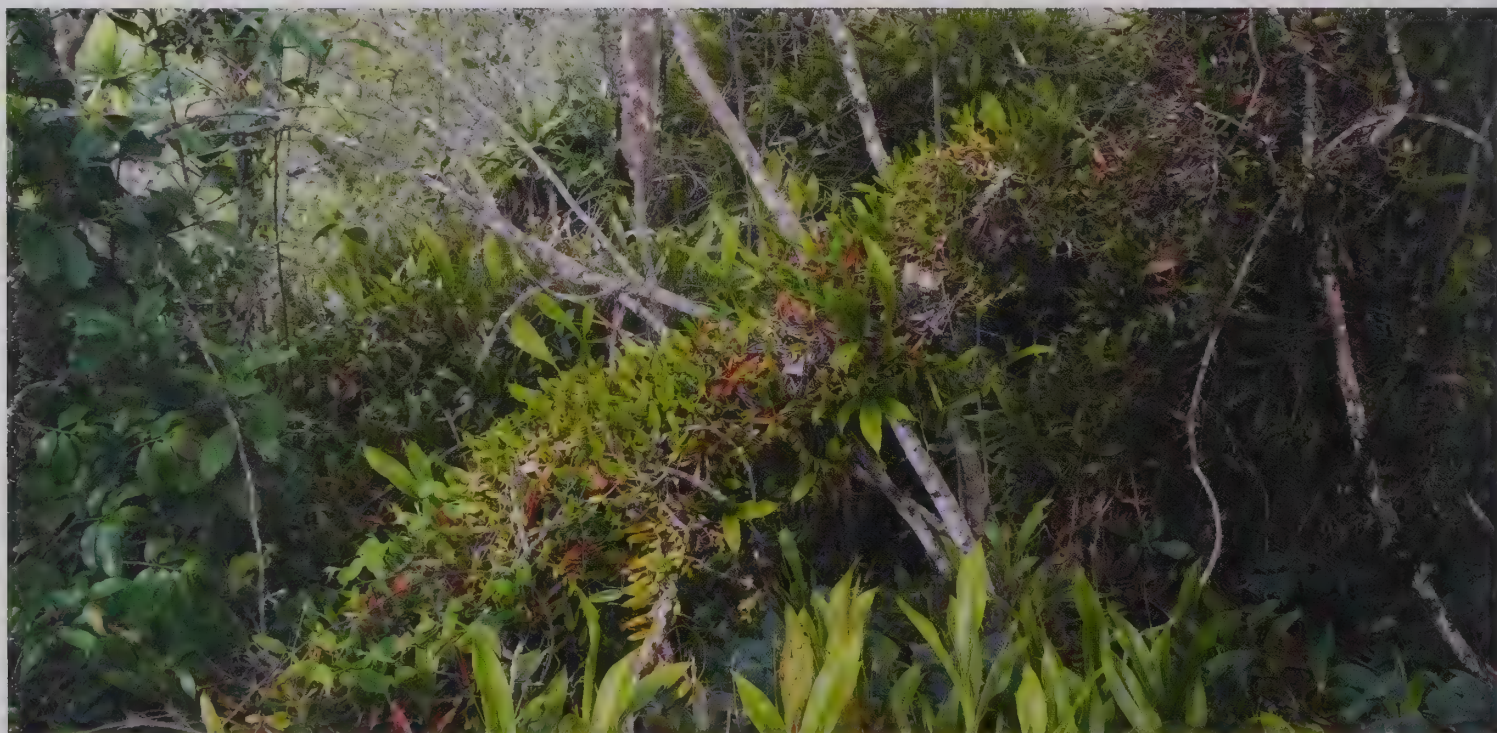


Figure 2.28 (above) Tropical montane forest atop limestone cliffs, rich in orchid species, northern Vietnam (Photo: Leonid Averyanov).

Miniature Orchid Culture

There are as many approaches to growing miniature orchids as there are hobbyists, and what may work well for one grower may not work for another. It is important to experiment with different approaches in order to find the best results. Each grower will have their own techniques and solutions to the challenges posed by their growing environments. Options for where to house a miniature orchid collection are numerous. More controlled environments include greenhouses, window boxes, windowsills, spaces under skylights, atriums, indoor light gardens, light stands, orchidariums, Wardian cases and terrariums. If one is fortunate enough to live in an area with a climate conducive to the growth of orchids outdoors, additional possibilities could include shade houses, lath houses, unheated greenhouses, porches, decks, balconies, breezeways, patios and positions on trees. Each environment has its own specific challenges, but the principal considerations, namely water, temperature, light, humidity, air movement and substrate, remain the same. It is also important to bear in mind that in many cases, species are more demanding to cultivate than hybrids.

Of major importance to the successful cultivation of miniature orchids is careful, close observation of the plants in question. Whilst growing miniatures follows many of the same basic principles of general orchid culture, many of these diminutive plants have very specific needs. They are also far more vulnerable to pest infestations. Mealy bugs, scale insects, aphids, mites, and thrips can quickly decimate a small plant while only causing cosmetic damage to a larger plant in the same period of time. A slug that chews just part of a *Cymbidium* flower could consume an entire *Platystele* plant overnight. Moss can present another issue; there are several species of moss that grow on the surface of media in pots or on mounts. Such mosses may certainly look attractive, but their steady, creeping growth must be watched carefully and controlled, as moss growths can actually smother a miniature. Some growers report that certain moss species can also prevent water and nutrients from easily reaching the roots, while others find that it may trap too much moisture beneath plants, thereby promoting root rot. Numerous species of weed also occur in collections, including *Oxalis*, *Pilea* and



Figure 3.1 (above) The delicately coloured flower of *Dendrobium microbulbon* (Grower: Marni Turkel).

Figure 3.2 (overleaf) *Masdevallia tubulosa* has remarkable spreading blooms of wonderful form (Grower: John Leathers)..



Cardamine, which may simply be an annoyance alongside larger plants, but may compete with smaller orchids for moisture, nutrients and light, potentially causing ill health or death. Ferns, though attractive and favoured by many, can be prolific and invasive; with surprisingly large, greedy root systems. The placement of miniature orchids with larger plants also requires careful attention; it is advisable to keep miniatures together, as smaller plants placed amongst larger ones may be overlooked and thus under-watered and/or excessively shaded.

In any growing area, there are always various microhabitats present; these may be warmer or cooler, shadier or brighter, wetter or drier, and so on. For plants to thrive, it is important to place each orchid in the most optimal area possible. If radically changing the placement of an orchid, such as from a shady position to a sunnier one, this should be done gradually in order to minimise stress or damage.



Figure 3.3 (above) Marni Turkel (Santa Rosa, California) grows many of her orchids on a system of hanging rings in her intermediate greenhouse. Marni developed this system to maximise space for her mounted, miniature plants after she had used up all of the wall space. An important feature incorporated into the hanger is a ball bearing swivel (the type used for fishing line) that allows the rings to rotate freely. The open wire improves air circulation around all sides of the mounts. Besides making watering very easy, the rotation allows plants to randomly reorientate to the light at every watering such that their growth and flower presentation are not unidirectional. The rings themselves are made from galvanised hardware cloth and are about 30 cm (12 inches) in diameter.

Temperature

The temperature requirements for the species discussed within this work are based on the conditions that they experience in nature. All orchids typically experience a diurnal temperature fluctuation of at least 6 °C (10 °F), and this should be emulated in cultivation. Species which occur naturally over a wide distributional and/or elevational range are more adaptable to cultivation, whereas those with more limited ranges, such as narrow endemics, sometimes have more strict requirements. Growing orchids outside of their normal temperature range can cause stress, possibly leading to disease and insect infestations, and may result in death.

Orchids in general require a cooler period during the winter months, although this may amount to just a few degrees for some species. It is important to observe this variance as it forms part of the natural growth cycle of the plants. During this dormancy, active plant and root growth ceases, some species may lose their leaves, and pseudobulbs may shrivel. Encouraging growth with warmer temperatures or water during this period may be detrimental, resulting in weak growths, failure to initiate inflorescences, or even loss of plants through rot.

For this work, we have classified the temperature requirements of miniature orchids in seven basic categories, namely; cold, cool, cool-intermediate, intermediate, warm, warm-intermediate and hot. These descriptive terms refer to the daily maximum and minimum temperatures that each species requires, as summarised in Table 3.1.

When it comes to warming your orchid environment, heat is usually provided by electric, oil or gas heaters. Electric heaters tend to be the most expensive to operate. If using an oil or a gas heater, make sure that it is properly vented; exposure to even minute amounts of ethylene oxide from the fumes of a leaky heater or faulty pilot light can cause newly developing flower buds to blast (wither and drop). Energy consumption may be reduced by using insulating bubble wrap on the interior of the greenhouse, and also via heat sinks, such as dark-coloured containers of water placed under benches. With its high heat capacity, the water in these containers will buffer fluctuations in temperature; it is warmed up by infrared (heat) energy from the sun, or equilibrates with the daytime temperatures of the greenhouse. Heat is then slowly released to the surrounding environment as it cools.

In temperate climates, it is important to have a backup for any heating system; power or heating system failures are somewhat of an inevitability over extended periods. Examples of suitable backups include generators (to provide power), electric heaters (if gas is the main system), or extra gas heaters. Thermostats are invaluable as part of any backup system, automatically switching on once a threshold temperature low is crossed.

Cooling of a growing area can be accomplished with a combination of shade cloth or shading compounds, such as white wash, evaporative (swamp) coolers and/or wet walls, oscillating fans, misting fans, exhaust fans, vents or air conditioning. The latter has a drying effect and must be compensated for by using humidifiers or misters. As with heating, it is important to have backups in the event of a power failure, and generators, shade-cloth, heat-powered vents or solar fans are all viable examples. Although it is obvious, the greater the climate extreme, the greater the need for precautionary measures.

Table 3.1 A key to the temperature range categories used in this work, with optimum night time and day time ranges indicated.

Temperature category	Nightly minimum		Daily maximum	
Hot	21 °C	(70 °F)	>29 °C	(>85 °F)
Warm	18–21 °C	(65–70 °F)	27–29 °C	(80–85 °F)
Warm-intermediate	16–18 °C	(60–65 °F)	25–28 °C	(78–83 °F)
Intermediate	13–16 °C	(55–60 °F)	23–27 °C	(73–80 °F)
Cool-intermediate	11–15 °C	(52–58 °F)	20–23 °C	(68–73 °F)
Cool	10–13 °C	(50–55 °F)	16–20 °C	(60–68 °F)
Cold	7–10 °C	(45–50 °F)	to 16 °C	(to 60 °F)

Figure 3.4 (facing page) The flower of this *Phloeophila* cf. *pleurothallopsis* species is not a classic beauty, but such flowers are attractive in their own right, and certainly fascinating subjects both from an aesthetic and a biological perspective (Grower: Andy's Orchids).





Light

Light is a fundamental requirement for photosynthesis. Too much light may result in orchids turning yellow (photobleaching), possibly becoming sunburned and, in extreme circumstances, perishing. Insufficient light will result in plants with weak growths that will languish and fail to bloom. The amount and duration of light required by orchids varies considerably; some thrive in bright light, many in dappled light, and others do best in shady conditions. During their dormancy, some orchids receive more light when their deciduous host trees lose their leaves during the cooler/dry season. An appreciation of the great degree of variation experienced by the different orchid genera can be gained by learning about their native habitats through reading or travel to orchid rich areas. This is not merely interesting, but also instructive, helping growers to cultivate their plants far better than they might otherwise.

Lumens are the standard unit by which light is measured, either by lumens per square metre (lm/m^2), called lux (lx), or lumens per square foot (lm/ft^2), called foot-candles (fc). Although the lux is the standard international (SI) unit of illuminance, the Imperial foot-candle unit remains widely used in the United States outside of the scientific community. A foot-candle is most simply defined as the amount of light that can be perceived one foot away from a candle. Our eyes are unable to reliably estimate the amount of light in an environment, and so the best means of determining light intensity is via a light meter. Inexpensive light meters can be purchased from some nurseries, photography stores, and online from many suppliers (see *Appendix IV*, Sources for further information).

Table 3.2 provides a key to the terms used to describe light levels in this book. If a light meter is unavailable, one can still estimate the amount of light in a growing area. Hold your hand 20–25 cm (8–10 inches) from a white piece of paper on a bright day at noon – that is, with your hand between the paper and the sun. Under bright light, your hand will produce a sharp, distinct shadow. Under bright diffused light, the shadow of your hand will have a softer edge. Under conditions of light shade, the shadow weakens, producing softer edges, although the outline of your hand can still be seen. Under medium shade, the edges of the shadow will start to blur, making it harder to perceive the outline of your hand. Finally, under deep shade, the edges of shadow are completely blurred, and the shape of your hand is not discernible at all.

Table 3.2 Light level categories with equivalent values in SI and Imperial units.

Light Level	Lux (lx)	Foot-candles (fc)
Bright	>53820	>5000
Bright diffuse	43055–53820	4000–5000
Light shade	19375–43055	1800–400
Medium shade	10765–19375	1000–1800
Deep shade	<10765	<1000

In a number of genera, leaf colour may indicate whether or not light levels are sufficient for individual plants. A plant with foliage of a darker green than usual may not be receiving sufficient light, whereas yellow foliage may be indicative of too much. A pleasing light green is usually the colour to strive for, though exceptions exist. During summer, or on exceptionally hot days, foliage may be at risk of burning, and protective measures should be taken, such as the addition of more shade cloth or shading compound, or repositioning to shadier spots. Where the leaves of larger plants may merely burn, a miniature may perish entirely, therefore size is a consideration.

Except under controlled illumination, the amount of light received by plants in a collection will depend upon a number of factors. These include the season, the latitude at which you live, the position and orientation of the growing area, shade from surrounding structures, the use of shading compounds or shade-cloth, and the placement of plants within the growing area. There may be zones that are very bright, but there are always shadier spots, such as corners and areas under the bench or other units where light levels are much lower. Sunlight is most intense in the spring and summer, when the sun is higher in the sky. Conversely, light is reduced as the days shorten in the fall and winter, when the sun sits lower in the sky. An area that receives a lot of light in the summer may thus be in near shade in the winter. To adjust for such changes, many hobbyists remove their greenhouse shading in the winter and replace it in the spring as day length increases and temperatures start to rise. Some use supplemental lighting to improve light intensity or duration, as well as to reach darker parts of the growing area. These annual day length changes often trigger inflorescence formation in many orchids, and so these seasonal alterations in light levels may play an important role in optimal orchid culture.

Figure 3.5 (facing page) A pendent inflorescence of *Trichocentrum pumilum* in full bloom is an impossibly pretty sight (Grower: Andy's Orchids).



Figure 3.6 (above) Multiple perspectives of a beautiful, artificially lit orchid column mount in the collection of Mikael Karlbom (Stockholm, Sweden). Mikael has been experimenting with different materials for terrarium and orchid growing and is well known for two of his products, EpiWeb and Hygrolon (Photo: Mikael Karlbom).



Artificial Lighting

Growing orchids under artificial light can yield excellent results, and some believe that it is the very best way of growing miniature orchids. It also allows those who live in apartments or other limited spaces to partake in the pleasure of growing orchids. For those in areas with long, dark winters, growing under lights may be the only means of enjoying these plants, and a light garden can provide a cheery focal point in an otherwise dreary season. For the addicted gardener, light gardens also allow one to enjoy the hobby year-round. Furthermore, growing under lights facilitates the closer inspection of individual plants in a collection under conditions that are always optimal. Artificial lighting is also necessary for those who use greenhouses in regions with long, overcast winters with little or no daylight. Supplemental light may also be required in greenhouses that are heavily shaded by trees or buildings for all or part of the year. Finally, artificial light is very important for those who germinate and raise seedling orchids.

When growing plants under lights, it is important to be aware of the various types and qualities of lights that are available. Light quality refers to the actual properties of the light source used. Light is not homogeneous; in fact, it comprises a spectrum of wavelengths of electromagnetic radiation. What we see as light, so-called *visible light*, corresponds only to a band of electromagnetic radiation with wavelengths of 400 to 700 nanometres (nm). In order from shortest to longest wavelength, the visible colours are violet, blue, green, yellow, orange and red. Each type of light source differs in its properties, and so the range of wavelengths of light produced, heat generation and light intensity all vary according to source. Table 3.3 summarises the contributions of different light wavelengths to plant physiology, and is relevant to the discussion of light sources that follows.

Table 3.3 Wavelengths of electromagnetic radiation pertinent to plant growth, with respective roles indicated.

Wavelength (nm)	Colour	Role
200–280	UV-C ultraviolet	Generally harmful to plants
280–315	UV-B ultraviolet	Can cause colour fade
315–380	UV-A ultraviolet	Not harmful, but not thought to be beneficial to plant growth
380–400	Start of visible light (violet)	Absorbed by chlorophyll
400–520	Violet, blue and green	Peak absorption by chlorophyll. Important for photosynthesis and vegetative growth
520–610	Green, yellow and orange	Less absorption by plant pigments
610–720	Red	Absorption by chlorophyll. Influence on photosynthesis, flowering and budding
720–1000	Far red to infrared (invisible)	Little absorption by chlorophyll. Infrared can cause warming, effect water absorption and transpiration, and influence flowering and germination

Fluorescent Lights

Fluorescent lights provide an excellent source of artificial light, with the added benefit of being more energy efficient than most other sources of artificial light. They come in many shapes, diameters and lengths. In the United States, the more common T8 and T12 tubes are 1 inch in diameter and 1.5 inches in diameter respectively. About 90% of fluorescent tubes are made in the T12 four foot length, and this size generally lasts longer. It also has the highest ratio of lumens (light output) per watt. The tubes come in a range of types, each with a specific spectral output (see Table 3.4). For those growing miniature orchids, only some tubes are appropriate, the tubes specially developed for growing plants being optimal. These so-called gro-tubes have a higher output in the desirable red-orange wavelengths (see Table 3.3). Some growers have found that using a combination of cool-white tubes with the special plant growing tubes, or a combination of cool-white with warm-white tubes, works well. One of the authors (RP) has grown miniature orchids under fluorescent lights for over thirty five years with excellent results.

Table 3.4 Types of fluorescent light tubes generally available, with spectral range output and general suitability indicated.

Type of Tube	Light Range	Comments
Cool white	Peak sharply in the green part of the visible spectrum	Inexpensive, available from many sources, but sub-optimal, and low in the necessary red and blue parts of the spectrum
Warm white	Peak sharply in the green part of the visible spectrum, with a shift towards the warm (red) end of the spectrum	Inexpensive, available from many sources, but sub-optimal, low in the necessary red and blue parts of the spectrum
Daylight	Output is a broader spectrum of wavelengths somewhat closer to natural light	Improvement over cool white and warm white, common, but slightly more expensive than cool white or warm white
Grow light	Output is strongest in the blue and red portions of the spectrum, with little or no light in any other part of the spectrum. Brands vary in width of blue and red energy bands	Designed to promote plant growth, light emitted is pinkish. Spectrum matches absorption peaks of chlorophyll. Commonly used for houseplants, available in hardware, hydroponic and lighting stores, also nurseries. More expensive
Full spectrum	Emits light in every spectral range, with all colours of visible light and small amounts of ultraviolet light	Harder to find, but available in pet stores and some hardware stores. Expensive
Tri-phosphor	Fluoresces very sharply in red, green and blue wavelengths	Light appears to be white, very bright, lacks UV spectrum. Not generally used for plants
Actinic	Blue end of the spectrum	Used in marine reef tanks, no application for plants, expensive
Reflector or aperture	Allows some control in the direction of light output	Not recommended and not generally used for plants
HO/VHO	High and very high output lights, emit more light. Types include cool white, warm white, daylight and grow light	Expensive, use more current, shorter-lived and the tubes get very warm

When growing plants under fluorescent lights, a number of general principles apply. Ideally, the tops of the plants should be located 15–30 centimetres (6–12 inches) from the light source, as light intensity will drop rapidly as the distance from the bulbs increases. Fluorescent light tubes also produce less light at each end than they do in the centre, and plants requiring brighter light should be placed directly under the centre of the tubes. For best results, the tubes should be replaced annually. It is thus helpful to write the date of installation on the metal ends of the tubes with indelible ink. If the ends of the bulbs have turned grey or blackish, they are likely due for a change. Fluorescent lights also require ballasts, auxiliary devices that regulate the current flow through the tube, and these may need to be replaced periodically. Sometimes it is easier and less expensive to replace the entire fixture rather than just the ballast. Note that the ballast itself generates some heat, which may or may not be desirable. The ballast can be left in place if additional heat is not problematic, or removed and placed outside the growing area where cooler conditions are vital.



High Intensity Discharge (HID) Lights

There are two categories of HID lamps, namely metal halide (MH) and high pressure sodium (HPS) lamps. Drawbacks of both types include their significantly higher energy usage and associated costs, as well as the greater expense of the fixtures and bulbs. HID lights are not generally needed for miniature orchid cultivation, but those who grow orchids that require higher light, such as *Vanda*, *Cattleya* and some *Dendrobium*, find them useful. The light emitted by both types of HID light is much more intense than that produced by fluorescent bulbs, but there are other important differences. Metal halide lamps emit light that is strongest towards the blue end of the spectrum, and plants grown under these tend to be compact and leafy. MH light does not distort the colours of the plants it illuminates, and they are therefore often used to light displays in living areas. MH lights come in several wattages; a typical 400 watt lamp can illuminate an area of 1.8 x 2.4 metres (6 x 8 feet) with 10,500–21,500 lux (1000–2000 foot-candles) of light. A recently developed MH lamp, known as Gold Halide, is becoming increasingly popular with plant growers. This type of MH lamp gives off more red/orange light, claiming to boost flowering in addition to supporting foliar growth. All types of halide light should be replaced at 6–12 month intervals.

Light emitted by HPS lamps is stronger at the red/orange end of the spectrum, and although these lights promote flowering, they tend to produce taller and more leggy growths unless supplemented by MH lamps or daylight. HPS lights also distort the colours of everything they illuminate, imparting a reddish-orange cast. HPS lights are often used as supplemental greenhouse lights, particularly during times of year when sunlight is scarce. HPS lamps also produce a lot of heat, which should be borne in mind; some people even use these lights to provide supplementary heat in their growing areas. HPS lamps may be used in combination with MH lamps. There are also light fixtures, known as conversion fixtures, that can switch from MH to HPS light bulbs at different times of day. HPS lights should be replaced at least every 12 months.

A motorised light mover can be purchased to systematically move the light fixtures back and forth along a railed track system, allowing orchids placed in peripheral areas to receive as much light as those more centrally located. The distance that orchids are placed from HID lights will obviously depend on their light requirements, but generally varies from 30–90 cm (1–3) feet from 400–600 watt fixtures. Plants with higher light demands should be placed closer to the lamps. Good air movement is also extremely important since HID lights generate more heat.

Light Emitting Diodes (LED)

Recent advances in LED technology have made this light source more useful to the horticulturist, and LEDs are of ever increasing popularity. These lights can be relatively inexpensive, bright and long-lasting, and emit the spectra of light required for plant photosynthesis. They consume much less electricity than other sources, do not require a ballast, and produce much less heat, allowing them to be placed closer to plants than other types of light. Moreover, the vast reduction in heat production means a corresponding reduction in plant transpiration, therefore reducing water requirements. These lights are very long lasting, and they are claimed to provide somewhere between 30,000 and 50,000 hours of light, depending upon the model. They come in various colours, and growers use a mix of bulb colours for orchids. Common light ratios of red:blue are 8:1 and 7:2, or red:blue:orange at 7:1:1. LED bulbs are rated at only 4–9 watts, and thus one can make a substantial reduction in energy expenditures. LED lights can be placed closer to plants without the worry of overheating. Since this is a relatively new way of growing orchids under artificial light, the authors could not locate established guidelines about distances, durations, light colour mixes, or indeed other requirements for success.

Lighting Schedule and Other Adjustments for Growing Under Lights

Day length is an important regulator of flower initiation. Long days may prevent certain species from developing flowers, whereas other taxa require them. In the greenhouse, day length will follow that of the seasons, but in the home, day length is regulated artificially. It is best to grow your plants in a room without frequent extraneous light, including ceiling lights, lamps, televisions and reading lights, as plants may be inadvertently exposed to abnormally long days. Perfect areas in which to grow orchids are basements

Figure 3.7 (facing page) The collection of Elle Ronis (Stamford, Connecticut). Elle grows her large collection of thousands of cool and intermediate growing orchids in the basement of her home. She uses 8 foot full spectrum fluorescent tubes and, in other areas, HID lights on tracks for lighting. Humidity is controlled by special room humidifiers that also cool the growing area. Air movement is provided by numerous fans throughout the space.



Figure 3.8 (above) The elegant blooms of *Masdevallia bolivensis*. This populous genus of Central and South American orchids includes a number of species of particularly remarkable form, in no doubt accounting for their popularity in cultivation (Grower: Elle Ronis).

and unused garages; these have less extraneous light, temperatures are cooler, and accidental water damage to other parts of a home may be less of a problem. If a basement or garage is unavailable, a north facing room (in the northern hemisphere) on the lower floor of a house would be the next best choice. In general, orchids receiving no natural light should receive 14–16 hours of light per day in the summer, and 12–14 hours in the winter. Some growers do not change the day lengths with seasons, and claim to see no differences in the growth and/or blooming of their plants. A timer is a necessity, allowing the lights to be turned on and off on a regular and consistent schedule. If needed, reflectors and reflective surfaces can be used to maximise the available light. Surfaces around the growing area that are painted white or covered with aluminium foil will also help to reflect light. Importantly, orchids should be spaced widely enough to allow ample light to reach all plant parts, and to keep them from shading one another. Keeping the bulbs clean and replacing them on a regular basis will help ensure that the plants receive optimal lighting.

Typical symptoms of excessive light include the yellowing of leaves and growths, with growths becoming progressively smaller. If the leaves are too close to or touch the light source, they may burn. Some symptoms of insufficient light include dark green foliage, etiolation (spindly, elongated growths), floppy foliage and a failure to bloom.

Humidity

Humidity is expressed as the ratio of water vapour present in the air relative to the amount of water that the air can hold at the given temperature. Warmer air can hold more moisture than cold air. When air becomes saturated with moisture, it will condense to form droplets of water. Warm, moist air coming into contact with cooler air results in condensation.

In nature, the greatest diversity and concentration of orchids tends to be found in areas of high humidity, such as moss, cloud, montane and elfin rainforest. In more arid regions, large numbers of orchids can still be found near courses and bodies of water, as well as in gullies and steep valleys. The presence of other epiphytes and lithophytes, including bromeliads, gesneriads, ferns, mosses, and lichens, also contributes to the relative humidity. These factors should be kept in mind when trying to replicate the habitat of an orchid in the growing area. Humidity is a critical component of good orchid culture, and regulated humidity is essential to the long term success of the plants in a collection.

Humidity is not a static condition, and diurnal variations in humidity do occur. Levels are highest in the late evening, during the night and into the early morning, and are lowest at mid-day. This is generally true of greenhouses and many outside growing environments. The humidity levels referred to in this work are defined in Table 3.5.

Humidity Level	Percent Humidity
Very high	>80 %
High	70–80 %
Intermediate	50–70 %
Low	<50 %

Table 3.5 Terms used to describe humidity levels, with percentage ranges indicated.

In cultivation, the suggested daytime humidity level for orchids ranges from 50–70 %, with levels increasing at night as temperatures fall. Maintaining these levels can be a challenge for those growing orchids in the home or in arid regions. The average home environment tends to have a humidity of under 40 %, and with central heating and the moisture absorbing nature of furniture, drapes and carpets, humidity can be as low as 5 %. Various means can be used to raise humidity, and growers often use more than one. In a greenhouse or outdoor growing area, misters and foggers can be used to easily elevate humidity. Wetting down the greenhouse floor on warmer or drier days is also beneficial. In the home, an easy modification is to use gravel-filled trays under your plants, ensuring that the dimensions of the humidity tray are larger than the plant containers. Purpose made humidity trays often have a built-in grating that prevents direct contact between the plants and the water. If using gravel-filled trays, consider using wire mesh or inverted saucers to raise the base of the pot away from the gravel, which can serve as a wick. With the rare exception of a few very wet growing species, orchids should never be left sitting in water. To keep the indoor growing area clean, it is advisable to remove and wash the gravel and trays every 2–3 months to remove any salt build up. Gravel can be treated with a weak bleach solution to remove algae. Sonic humidifiers, which can vaporise up to a gallon of water per day in combination with a small fan, can also be used to elevate the humidity in an indoor growing area. Due to the potential for salt build-up on leaves and equipment, the use of reverse-osmosis or deionised water with a sonic humidifier is advised. Purchasing a small sensor that measures humidity and temperature is an excellent means of better understanding the condition of the growing environment.

Excessive humidity is rare, but combined with over-watering and a lack of air movement, high humidity can cause problems, generally in the form of rot. Low humidity is indicated by a lack of vigour, reduced growth, shrunken pseudobulbs and some dessication.

Air Movement

Air movement is a very important factor for healthy orchid culture. Stagnant air results in weaker plant tissues, the trapping of excessive heat and the promotion of bacterial and fungal infections. Fresh air currents enable more efficient transpiration and temperature control, and also provides fresh oxygen and carbon dioxide. In any growing area, air movement should be continuous, such that leaves and inflorescences are always gently moving. In the house, air movement can be accomplished by leaving a room window open during mild weather, or by using an oscillating fan to circulate the air. In a greenhouse, fans should be placed in several areas, both high and low, to prevent stagnant corners. If using HID lighting, fans are particularly important for heat dispersal, to cool the foliage, and also prevent burning of plant tissues. Of critical importance in hot or very humid environments, air movement promotes transpiration, and with it, cooling of the plants themselves.

Water

Orchids grow in many different habitats, each with its own seasonal and regional rainfall patterns. Some species can receive rainfall at any time of year, whereas others experience heavy seasonal rains. Orchids in the latter situation may receive abundant rain during the wet season, but experience up to 8 months with little or no rainfall. In much of eastern Australia, orchids receive intermittent year-round rain, sometimes interspersed with long dry periods. In contrast, some montane regions, such as those in New Guinea, Borneo, and portions of Andean Colombia, Ecuador, Peru and Bolivia, receive almost daily rain, mists and/or fog.

Four basics of watering form a critical part of successful orchid culture; water quality, frequency, temperature and amount.

Water Quality

Water quality is extremely important. It is therefore critical to understand the properties of the water that is used to maintain a collection. It is prudent to test this water in order to discover what pH value it has, and what minerals and elements are dissolved in it. Many municipalities publish water quality reports, and these are often available online. However, these may not be dependable. For example, in parts of the San Francisco Bay area, the water quality is usually good to excellent. Nonetheless, some local municipalities mix well water (from underground aquifers) with the high quality water at unpublished intervals, and the authors are aware of several growers who have seen drastic declines amongst sensitive plants in their collections because of this practice. Given the irregularities in municipal water supply quality, the purchasing of personal pH and total dissolved solids (TDS) meters is highly recommended.

The pH value is a measure of the acidity or alkalinity of a solution. A pH of 7 is neutral, less than 7 acidic, and greater than 7 alkaline. Orchids grow better with a slightly acidic pH, ideally between 5.5–5.8. Fortunately for most hobbyists, the combination of water, media and fertiliser generally used is within an acceptable range, and success can be achieved whilst knowing almost nothing about pH. However, a basic understanding of pH can improve success with orchids. The water used is only one of the factors that influence pH; the others are the growing medium and fertiliser. *Sphagnum* moss maintains a more acidic environment. Bark also tends to lower substrate pH; although pine bark maintains a somewhat higher pH than fir bark, both become more acidic as they decay. Fertilisers in general, and nitrogen specifically, supplied as either ammonium or urea also tend to lower the pH of water. An acidic pH increases the solubility of available food and micronutrients, which in turn influences their availability to the roots. Thus the same plant in different potting media, or watered with a different type of fertiliser, may take up nutrients at rather different rates.

To gauge the pH of an orchid's environment, simply collect the water that has run through the pot during watering and measure the pH. One should sample water from orchids potted in different media to see if adjustments need to be made. If the pH of the water supply needs adjusting, an acid such as vinegar, phosphoric acid or citric acid can be added to lower pH, or a base such as potassium bicarbonate used to bring the pH level up. Make adjustments incrementally, mixing well and measuring the pH again. Repeat until the desired level is reached. Fine tuning this aspect of orchid culture will reward the enthusiast with healthier, more vigorous plants. It is also important to check the pH of the water supply periodically; the pH of tap water can change from time to time. Since acidic water increases the leaching of lead from water pipes, many municipalities adjust the pH of their water by adding lime, soda ash or sodium hydroxide so as to minimise the risk of lead being dissolved from pipes and pipe fittings.

Figure 3.9 (facing page) *Masdevallia parsonsii* produces tall, elegant blooms of remarkable colouration, flushed deep pink centrally and yellowish green towards its extremities (Grower: Ron Parsons).





Figure 3.10 (above) The white flowers of *Meiracyllium trinasutum* f. *alba* emerge from a specimen mounted on cork bark (Grower: Howard Gunn).

Even more importantly than pH, some orchids can be very sensitive to the total dissolved solids (TDS) in their water. Dissolved solids are salts or compounds that dissociate in water to form ions. Some common ions that make up TDS are sodium, sulphate, chloride, calcium, magnesium and bicarbonate. Sea water has a TDS value of about 35,000 ppm, distilled water should have a TDS value of 0 ppm, and reverse osmosis (RO) water a TDS value of less than 10 ppm. In some areas, tap water can be high in TDS, and this can be extremely detrimental to long term orchid survival. Most municipalities publish an annual report on water quality. The TDS values are average levels, and may vary from one day to the next, often dramatically where mixing with well water or when seasonal water source changes occur.

The purchase of a TDS meter is highly recommended so that water supply quality can be monitored. The ideal range for watering orchids is from 50–100 ppm, although TDS levels in most areas are slightly to significantly higher than this. A number of species, particularly those originating from high rainfall areas, such as *Dendrobium cuthbertsonii* and many pleurothallids, require even lower TDS levels (± 50 ppm). If a water supply contains high levels of TDS, the salts can be reduced using reverse osmosis. It should be noted that RO water is so pure that it requires additional adjustments (see *Fertiliser*). For those with just a few plants, one can purchase spring water or bottled water. It is important never to use chemically softened water on orchids. Softened water contains high levels of TDS, much of which is sodium bicarbonate, while trace ions such as manganese, calcium and magnesium have been entirely removed. It also generally has a neutral to alkaline pH. Softened water will quickly kill orchids. Rain water stored in a covered tank protected from leaves and other debris may also be used. However, rainwater that has run off any galvanised metal surfaces should not be used as it can contain high, potentially toxic, levels of zinc. It should also be noted that collecting rainwater is not legal in some parts of the United States, such as Utah, Washington and Colorado, though in certain states this varies between counties.

Watering Frequency

Our recommendations for the watering of individual species are based on the rainfall patterns that they experience in nature. In cultivation, watering frequency is dependent upon multiple factors, including whether plants are grown potted or mounted, soil medium, season, temperature, humidity, available light, air movement and species-specific requirements. Generally, mounted plants need to be watered more frequently than those in pots. There are orchids that require constant moisture, some that need to dry out briefly between waterings, and others that require regular, but intermittent moisture. In general, potted orchids do not need to be watered as frequently as those on mounts. Moisture-loving plants on mounts may require moss, whereas those in pots are best in a moisture retentive mix such as moss or a fine bark mix. Plants grown in a high humidity environment may not require moss at all on their mounts. Those species that need to approach dryness or dry out between waterings should be grown on a mount with little or no moss, or potted using a medium bark mix to allow adequate aeration around the roots. Clay pots generally dry out more quickly than plastic ones, and plants in small pots tend to dry out more quickly than those in larger pots. When freshly potted, bark is more water repellent, and may need more frequent watering at first, resuming a regular schedule after a few weeks.

In the warmer months of late spring, summer and early autumn, plants tend to require more frequent watering, but this should be reduced in late autumn, through winter and into early spring when day length is shorter, light often reduced, and temperatures low. When growing under natural light conditions in winter, try to water only on bright, sunny days. Some people find that their greenhouses stay too humid and wet in the winter, and in these situations a dehumidifier may be helpful. Most orchids require more moisture during the growing season, when new shoots are sprouting and roots resume growth. Although some collections maintain high levels of humidity throughout the day, those that experience a drop in humidity as temperatures increase may require more frequent watering. Brighter light and high air movement also tends to dry plants out more rapidly, and recognising when your orchids need to be watered is a skill acquired with experience. By studying the plants in a collection and picking up pots to appreciate what they feel like when dry versus holding moisture, one quickly learns the difference between a plant that is dry and in need of water, and one that does not. In fact, there is a wise orchid adage that states, “if in doubt, don’t water.”



Figure 3.11 (above) *Masdevallia caloptera* has cute and certainly pretty flowers dashed with purple and trimmed with orange (Grower: John Leathers).

Most orchids have some water storage capacity in the form of pseudobulbs, thickened canes and/or succulent leaves, and even some plants that lack these, such as pleurothallids, can stay dry for up to several days with no permanent damage, provided it is not too warm. A common cause of orchid death is over-watering, although this tends to happen more frequently with potted orchids. As such, ensuring good aeration of the roots is just as important as watering correctly. As the soil medium begins to break down, or if kept constantly wet, it begins to compact, reducing critical airspaces around the roots, hence the need for repotting at regular intervals. Species that dislike continuous moisture will soon develop problems if over-watered. In time, the roots will start to rot and die, and eventually the plants will perish unless timely remedial steps are taken.

There are many species that require a dry rest period, simulating what they would experience in nature, and during this time, the plants can be considered dormant. Rest periods can vary in length from 1 to 8 months, depending upon the species. A dry rest period does not mean that the plants are totally deprived of moisture. Many require high humidity, and most should be given an occasional misting to prevent dessication. In particular, miniatures on mounts will actually benefit from an occasional, slight watering every 7 to 14 days, depending on the species and local conditions. In nature these plants may not receive any rain, but they often experience nightly condensation and high humidity, helping them to survive the dry season.

Although most sources suggest that watering should be carried out early in the day to allow plants to dry out by nightfall, this is not always the case. In the heat of the summer, and in areas that are hot and arid, watering in the evenings may be advantageous in that it allows plants to absorb water over a protracted period, rather than drying out almost immediately. Ensure that air circulation is good to brisk if watering in the evenings.

Watering Amount

When watering, it is best to do so thoroughly, ensuring that water flushes out from the bottom of the pot. Some growers will even water their plants a second or third time within minutes of the initial watering. Thorough watering also helps to leach accumulated salts from the medium. When watering mounted orchids, the moss (if used), roots, plant and mount should all be thoroughly wetted. It is important to deal with each plant individually and remain conscious of its needs. To make maintenance more easy, group plants with similar watering requirements together.

Water Temperature

When watering your orchids, it is best to use tepid to lukewarm water. Watering your plants with icy cold water is severely damaging, causing root shock, cell collapse in delicate new leaves, growths and flower buds, die back of root tips, and also lead to secondary problems such as bacterial or fungal disease. In areas with cold winters, storing containers of water in the greenhouse and using a pump system to water is a relatively easy way to have room temperature water for your orchids. On-demand water heaters are also available for greenhouse use, warming the incoming water to safe temperatures. Conversely, when watering on warm or hot summer days, ensure that the hose is flushed clear of sun-heated water prior to use.

Typical symptoms of over-watering include softened, discoloured areas of rot on the leaves and/or pseudobulbs, root rot or dead roots, as well as loss of vigour. Plants growing in inadequate conditions such as low light and poor air circulation are more susceptible to over-watering. Symptoms of under-watering include stunted growth, shrivelled or wrinkled leaves and pseudobulbs, and sometimes excessive pigmentation of the leaves and pseudobulbs.



Fertiliser

In their natural environment, orchids obtain their nutrients from surrounding organic matter, for example decomposing leaves, bird or animal faeces, or dissolved nutrients in rain water. Importantly, these nutrients are available only in minute quantities, a fact that should inform one's use of artificial fertilisers. Although some growers do not fertilise their orchids at all, the authors feel that it is important. Fertiliser helps already healthy orchids to produce larger, stronger growths and inflorescences, as well as more flowers. In general, species orchids require less feeding than hybrids, and miniatures less feeding than larger plants in turn. Indeed, it is better to err on the side of too little rather than too much when it comes to feeding orchids.

There are many types of fertiliser, and some are specially formulated for orchids. In general, one should never exceed the manufacturer's recommended dilution, and the majority of orchid growers use concentrations one-half to one-quarter of this amount. A commonly heard phrase is "weakly, weekly"; in other words, orchids should be fed with a weak solution of fertiliser on a weekly basis. Some growers opt to use a very dilute fertiliser solution every time they water, but flushing plants with pure water on a regular basis is strongly recommended if plants are fed in this manner.

If plants are overly dry or stressed, it is best to water at least one or two hours before fertilising. Orchids generally absorb nutrients quickly, within a half-hour or so, and some growers flush their plants with additional fresh water about one hour after fertilising. It is important not to feed unhealthy plants, such as those that lack roots or are showing signs of rot; fertiliser will not resuscitate them, and in fact may cause further damage.

Fertiliser is prepared with variable amounts of nitrogen (N), phosphorus (P) and potassium (K), and the numbers commonly seen on fertiliser packaging refer to these three elements respectively. The most commonly seen orchid fertiliser is formulated 30–10–10, a high nitrogen type. Many growers use this formulation year round, albeit with lower proportions and frequency during the winter. Some growers use the high nitrogen formulation during the growing season, but switch to a high phosphorus (P) fertiliser at the end of the growing season to promote and initiate larger inflorescences. The pseudobulbs or canes produced under such a regimen are often much larger. These formulations may or may not be important, but many growers swear that this is a part of their success. Others fertilise their orchids with general plant fertilisers with a more even formulation, such as 20–20–20 or 10–10–10, and produce equally beautiful plants. Trace elements such as magnesium, calcium and iron are also important, and most fertilisers contain these in minute quantities. Those orchids that only grow on limestone in nature may benefit from or even require the addition of washed (salt-free) oyster shell or dolomitic lime to the medium.

If using water that has been filtered through a RO filtration unit, it is important to ensure that the necessary trace minerals are being supplied. RO water is pure, and lacks these important minerals. Some fertilisers have therefore been specially formulated for use with RO water, and are supplemented with additional trace minerals. They are available from many different suppliers. The addition of small amounts of tap water is also a means of providing essential trace elements. Simply supplement RO water with a small amount of tap water (usually 10 % or less by volume). Test the TDS to make sure that the desired level has been reached, and add either RO water or tap water to adjust as necessary.

No specific types of fertiliser are recommended here since they are a matter of personal preference. However, it is important to bear in mind that certain species do not require food year round; plants with a winter rest period (dry or reduced watering) should not be fed at this time, as feeding is detrimental, initiating and promoting weak, thin growths. Plants that naturally grow throughout the year, but which are cultivated in areas with short, overcast or cooler winter days should have reduced fertiliser during the winter months for the same reason.

Signs of excessive fertiliser include blackened (burnt) leaf tips, drying root tips and shortened roots. There are no real symptoms of insufficient fertiliser; plants will grow, but not truly thrive to the same extent. Insufficient nitrogen may result in small leaves on an otherwise larger-leaved plant. Too much nitrogen may also result in soft, lush, leafy growths that are both darker green than usual, and excessively long and drawn out to the point that they are prone to collapse. Proper and regular application of fertiliser will produce plants with larger, stronger pseudobulbs (or canes) and leaves, and stouter, more heavily flowered inflorescences.

Growing areas

Greenhouses

For many growers, a greenhouse is the ideal place to cultivate orchids. A greenhouse allows one to grow orchids in a controlled situation with regulatable temperature, humidity, water, air circulation and shading. Moreover, a greenhouse provides a vastly larger growing space than might be available in an indoor light garden, on a windowsill, or indeed in most other types of growing areas. However, greenhouses can be costly to purchase or build, install and maintain, and set-up can also be complicated. Many counties and cities have highly restrictive and complex building and zoning regulations that can make it a challenge to construct a greenhouse in certain areas. Once installed, a greenhouse requires considerable experimentation to get the various elements working correctly, and bench design and layout, heater and fan locations, temperature controls, temperature and humidity monitors, the siting of shading, misters, humidifiers and indeed plants must all be carefully orchestrated. Finally, a greenhouse is a larger space, requiring considerable effort to maintain in a good and clean condition. It is beyond the scope of this book to elaborate further, but many books address the various aspects of greenhouse design and construction, as well as maintenance and plant culture (see *Appendix IV*).



Figure 3.13 (above) As if plucked from nature, Bruce Rogers grows this wonderful collection of miniature orchids on an orchid-scaped rock in an intermediate greenhouse in San Francisco, California.

Outside Growing Areas - lath houses, unheated greenhouses

In some parts of the world, such as Florida, coastal California, Hawaii, central and southern Mexico, eastern Australia, parts of the Mediterranean, coastal South Africa, possibly parts of New Zealand, as well as in most tropical and subtropical regions where epiphytic and lithophytic orchids occur, it is possible to grow various orchids outside, or at least in unheated enclosures. In tropical and subtropical regions, orchids may be grown in lath houses and shade enclosures, directly on trees, under trees on poles or other structures, or even out in the open. In areas too cold to grow orchids outside year round, they may be moved outside for the late spring to early autumn months. Many hobbyists find that summering their plants outside has a rejuvenating effect. However, growing orchids outside presents its own set of challenges, with temperature and humidity issues being the most difficult to control. Orchids grown outside can be more susceptible to damage from mice, rats, squirrels, possums and other mammals, as well as birds, snails, slugs, aphids and other insect pests. Thought should be given to enclosing the growing area with some type of screening so as to keep out at least some of these pests. Nonetheless, orchids grown outside or in unheated growing areas are significantly less costly to maintain. Some additional infrastructure is usually required, including benches, shade cloth, wire mesh and possibly a misting system. Air movement is usually good in such sites, and the desirable day/night temperature differential is usually a given. If using an unheated greenhouse, oscillating fans and/or exhaust fans can provide sufficient air circulation and prevent heat build-up.

Light Gardens

In the absence of a greenhouse or a window suitable for the cultivation of miniature orchids, the creation of a special indoor habitat can make for a wonderful project. Prefabricated units, such as light stands, Wardian cases and orchidariums can be purchased from commercial sources. Alternatively, it is possible to design a customised light garden. Whether shop purchased or homemade, all share a number of common, but essential components:



Figure 3.14 (above) The collection of Ron Parsons (South San Francisco, California). Ron grows his collection of cool to intermediate growing miniatures in a home-made light garden in his garage. He uses a combination of cool white and daylight fluorescent tubes for lighting. Humidity is provided by water-filled trays under the plants and plastic sheeting around 3 sides of the growing area. Air movement is provided by an oscillating fan placed in front of the collection. Hanging plants are placed on hardware cloth to maximize the growing area. The temperature range in the garage ranges from 11–26 °C (52–78 °F), so extra control of temperature is not required (Photo: Brad Cotten).

Fans: To ensure air movement, oscillating fans are recommended. Computer or small refrigerator fans, though adequate in the short term, are often short-lived and unable to effectively circulate air within the entire growing area.

Water catchment: It is useful to have some kind of catchment tray(s) that allow water run-off to be siphoned out periodically. Metal or high grade plastic trays are best; thin plastic trays are common, but tend to degrade quickly, leading to possible leakage.

Light and timers: As discussed previously, one may elect to use fluorescent, HID or LED lighting. The distance of the lights from the plants will depend upon the choice of light fixture and the plants' needs. Timers are essential to day/night cycle regulation.

Heat or temperature control: It is best to select a room that is suitable for orchid cultivation, ideally one where there is not a lot of extraneous light that may affect day length. Ideally, a 6–8 °C (10–15 °F) day/night temperature differential is needed for optimal plant health. Plants that do not experience this temperature drop often suffer in the long term. Small heaters or coolers equipped with a programmable thermostat may be required to regulate temperatures as needed.

Hanging points: Walls or mesh can be installed along the sides and back to allow for the hanging of mounted plants. It is useful to line the walls of the enclosure with heavy plastic sheeting that extends down into the water tray. This will direct the water run-off into the trays below when watering the mounted plants.

Watering systems: An easy way to water indoor plants is to use a garden pump sprayer. These have long wands with nozzles that can be adjusted to produce a relatively fine mist or a direct jet spray. These are ideal for watering plants in a light garden. Automated systems are a luxury for small collections, but can facilitate maintenance and allow peace of mind for short periods of travel.



Figure 3.15 (above) The collection of Mary Gerritsen (San Mateo, California). Mary grows her collection of cool-intermediate orchids in the 11 square metre (120 square foot) greenhouse that stands in her garden. Temperature control is accomplished via a small electric heater, a swamp cooler, multiple fans, shade cloth and vents. Humidity is provided by wetting of the gravel floor, and in winter a dehumidifier is used to prevent excess moisture from building up (Photo: Mary Gerritsen).



Figure 3.16 (above) A broader view of the home-made light garden constructed by Ron Parsons in his garage. The inclusion of a central shelf has not only allowed Ron to make more economical use of the space, since it provides an additional tier upon which to place pots, it has also made it possible to install an additional bank of fluorescent light fixtures, ensuring that a maximum amount of light is able to reach all of the plants in this part of his collection.

Figure 3.17 (facing page, above) Walter Crawford grows his collection of orchids, which includes quite a few miniatures, in his basement in Milwaukee, Wisconsin, a part of the United States with very cold winters and hot summers. He uses T-5 fluorescent light fixtures which, in addition to light, produce some additional heat that helps to maintain temperatures in the winter months. He uses thick glass block windows to let in additional light, and opens these in the summer months to provide ventilation with the assistance of small fans. A timer-operated misting system runs for ten minutes every four hours in order to increase humidity, and he waters the mounted plants daily with RO water using a Fog-It nozzle. In order to contain the excess moisture, he has lined the walls with Chemlite, a type of fibreglass panel that is commonly used in the food industry. His winter temperatures range from 10–13 °C (55–50 °F) at night and 22–25 °C (71–76 °F) during the day, and 21–23 °C (69–74 °F) at night and 25–27 °C (77–81 °F) during the day in summer.

Figure 3.18 (facing page, below) Karma Forester lives in Gothenberg, Sweden. She grows her collection of mostly miniature cloud forest orchids in a large terrarium (formerly a home for boa constrictors!) in a spare bedroom in her apartment. For lighting, she uses four 80 watt compact fluorescent lights rated at 6000 lumens each, operated on a 12 hour on, 12 hour off schedule that is controlled by an electronic timer. Air is circulated by four small computer fans, and humidity is provided via a timed misting system and a humidifier. She uses RO water for all watering and misting. In the summer, temperature control is provided by fan-operated cool-intake ducts, which bring in cool air from the outside, and also a small portable air conditioner. These are both controlled by a thermostat. For more information about her growing conditions, visit her website at www.orchidkarma.com.



Windowsills and Window Boxes

Although the first environment that hobbyists begin with is often a windowsill or window box, these can be amongst the most challenging places to grow orchids, and miniatures in particular. There may be difficulties in regulating light, temperature and humidity. Exposure is among the most important decisions, but bear in mind that this can be influenced by outside factors like shade from trees, walls, buildings, hills, mountains, or conversely, by additional light reflected from light-coloured surfaces such as buildings, sidewalks, patios, fences and bodies of water. A window that receives morning light is certainly the best choice due to the cooler temperatures and less intense light. Windows that receive midday or late afternoon sun can be exposed to harsh extremes of light and temperature that may be too intense for successful miniatures cultivation unless ameliorated by the use of sheer shades and/or curtains. In the northern hemisphere, windows with a southeast exposure are probably the best, with east or south the next best choices. For much of the year, west-facing windows have very intense afternoon and early evening light. This can lead to excessive heat build-up and reduced humidity, risking leaf burn and even the possible loss of smaller plants. North-facing windows are generally the least desirable, since this is the shadiest and coldest orientation, though reflected light may improve this. Light is often insufficient for all but the most shade-loving plants, and supplemental lighting may be required. In the southern hemisphere, the north to south directional choices are reversed. In both window environments, one or more oscillating fans should be set up in the growing area to provide the necessary air movement and help dissipate heat. Extra humidity can be provided via humidity trays.

Terrariums

There are many types of container that can serve as a terrarium, but all basically consist of small, enclosed, self-contained environments. Examples include prefabricated terrariums, as well as covered aquariums and large, covered glass or plastic jars or bowls. Most orchids will not tolerate such conditions for long, but a small number may thrive under conditions of very high humidity and little or no air circulation. These include many *Lepanthes* and other select pleurothallids, as well as various jewel orchids (*Anoetochilus*, *Macodes* and *Ludisia*). In contrast with the small house plants seen in terrariums, orchids (other than jewel orchids) are not generally planted, per se, but are grown on mounts and hung on some type of mesh system. Although this means of growing orchids is not for everyone, it can be rewarding. The authors have seen large, thriving collections of *Lepanthes* grown in terrariums, and interestingly, though no moss was used on the mounts, these plants had incredibly well-developed root systems.

The above selection is by no means a complete listing of the environments in which people grow their miniature orchids, but for these and all other environments, the same basic culture requirements must be met.



Figure 3.19 (left) A landscaped terrarium in the care of Mikael Karlbom of Sweden, using fluorescent tubes as the main source of illumination (Photo: Mikael Karlbom).

Figure 3.20 (right) Spiro Kasomenakis (New York City) maintains his indoor collection next to a window. Cool and warm fluorescent tubes provide extra lighting, and he controls humidity with a combination of humidity trays under his plants, an ultrasonic humidifier and plastic sheeting. Air movement is provided by small fans. He controls temperature through a combination of room air conditioning and central heating.



Potting and Mounting Orchids

Orchids can be grown in pots or baskets, as well as on mounts. Some species may be grown in any of these, while others, out of necessity, can only be grown mounted. Most orchids grown in pots can also be grown on mounts, but the reverse is not true. Moisture loving species are often grown in pots, particularly many pleurothallids, simply because sufficient moisture is generally difficult to provide when mounted in some situations. The growth habit of a plant often determines its needs. Orchids with an ascending habit (e.g. *Prosthechea campos-portoi*), rambling or creeping habit (e.g. *Dendrobium linguiforme*), widely spaced growths (e.g. many *Bulbophyllum*), or with descending growths (e.g. *Stelis gemma*) require a mount to do well. A number of species with descending inflorescences also display better when grown on a mount (e.g. *Masdevallia hartmannii*), whilst others, like *M. patula*, grow perfectly well in a pot, but produce inflorescences so long that they would hang below the base of any pot; they are thus best displayed mounted in a small basket or a net pot.

In this section, the various types of potting media and pots are discussed, followed by repotting advice and a guide to mounting materials and the effective mounting of plants.

Potting Media

The potting media used for orchids determines many of the other aspects of orchid culture; watering frequency, repotting and fertiliser requirements are all affected by the choice of medium. There are numerous choices of potting medium to select from. For miniature orchids grown in pots, fine fir or pine bark (or a mix containing both of these) or New Zealand *Sphagnum* moss works well. The advantages and disadvantages of these and other types of media are summarised in Table 3.6.

Table 3.6 A review of the various types of potting medium suitable for the cultivation of miniature orchids.

Media Type	Pros	Cons	Comments
Fir bark (<i>Pseudotsuga menziesii</i>)	Comes in various grades from fine to large Relatively long lasting (up to 2 years) Generally promotes healthy root growth	Must be shaken over a mesh to remove dust and fine particles If rinsed, it becomes sticky and difficult to pot with Fibrous pieces, heartwood and rocks must be removed so that bark is evenly graded	Plants in small pots requiring continuous moisture may need to be re-potted annually
Pine bark (<i>Pinus radiata</i>)	Comes in various grades from fine to large More readily available Harder than fir bark, said to last longer Claimed to be less acidic as it decays Works especially well with larger plants of commonly grown genera e.g. <i>Cymbidium</i>	New pine bark is more water repellent than fir bark for longer periods	Many growers report that plants in smaller pots generally grow less well in pine bark than they do in fir bark <i>Orchiata</i> brand should not be washed or soaked before use
<i>Sphagnum</i> (New Zealand, Tasmanian, Chilean, Peruvian)	Promotes good growth in most moist growing species Easy to pot with Has anti-fungal properties Can help promote new roots and growths on stressed plants Can be used as a component of various orchid mixes including terrestrial	Inconsistent quality; good quality <i>Sphagnum</i> is difficult to find Relatively expensive Often needs cleaning before use to remove debris Plants best re-potted every year Hard to re-wet when dry Tasmanian moss not often seen outside of Australia Chilean/Peruvian moss compacts more readily than New Zealand moss Hard to leach salts Requires good quality water	Moisten, do not wring out before use, as moisture retention capacity is reduced. It is best to use the most expensive grade e.g. AAA grade New Zealand, 5-star Chilean Some growers report that slime algae forms on the surface in high moisture environments Sponge rock, perlite or styrofoam chips can be added to moss to improve aeration and delay compaction

Osmunda fibre (<i>Osmunda regalis</i> or <i>O. cinnamomea</i>)	Orchids grow very well in it, particularly large-rooted plants Open and airy Does not compact easily and lasts for years Provides nutrients as it decays	Difficult to find Expensive Must be packed firmly in pots Not sustainably harvested	Of questionable value for miniature orchids
Coir	Made from ground coconut husk fibre Inexpensive Relatively available Holds moisture (up to 10 times its weight) for longer periods Promotes good root growth Easy to pot with Some people find seedlings do well in it	Needs to be soaked and rinsed several times to remove salts Tends to stay too wet if watering is frequent Breaks down quickly (faster than bark) Should be mixed with sponge rock or perlite for aeration	Use of coir produces mixed results Many growers report initial success, but later problems due to media staying too wet
Coco-chips	Made from chunks of coconut husk, ensuring aeration Inexpensive Relatively available Holds more moisture than bark	Needs to be soaked and rinsed several times to flush out salts Breaks down more quickly than bark	Gives mixed results depending on whether watering is light or heavy
Pumice (natural volcanic rock)	Relatively available Does not rot, extremely long lasting Retains moisture Holds a lot of air Inert	Accumulates minerals; do not use if water supply has high TDS content Mixed results with different genera Often unsuitable for many miniatures or seedlings	Must use horticultural grade Best used as part of a mix with other ingredients
Tree Fern fibre (from trunks of tree ferns from southeast Asia and Central and South America, in the family Cyatheaceae)	Long lasting Good drainage and aeration Chopped tree fern fibre can be used as a component of other mixes Comes in various grades Chunks can be used as mounts for tiny miniatures	Interior of chunks or lower levels of fibre in large pots may stay too wet, rotting roots Short-fibred grade can carry many fine particles Long-fibred grade too long for small pots	Some species dislike tree fern fibre and roots will not attach Tree fern fibre is very acidic and stays wet Requires some practice and skill to use properly Rarely used by itself, often best mixed with moss and perlite
Redwood fibre	Readily available in United States Very inexpensive Easy to pot with Some species develop larger and more massive root systems	Water repellent; can have dry areas within the pot Fibres may develop mould Mixed quality, often needs to be carefully sorted to remove debris	Mixed and inconsistent results with various orchid genera and species
Rockwool	Inert, does not break down Water retentive, good for moisture loving species Chemical free High degree of porosity	Unattractive/unsightly in pots May remain too wet Tends to develop algal slime on surface Provides no nutrients Very dusty when dry	Not commonly seen as a potting medium for orchids

In the culture recommendations made for individual species, fine bark mixes are often recommended. Most growers seem to have their own special recipes for potting mixes. What might work well for one grower may not work for another due to differences in conditions of culture. Most mixes contain bark as the primary component, with varying proportions of one or more of the following ingredients: sponge rock or perlite, quartz pebbles, clay pellets, red or black lava, polystyrene chips, chopped or shredded *Sphagnum* moss, chopped tree fern fibre, rockwool, horticultural charcoal and chopped coconut husks or fibres. Most of these ingredients also

come in various grades or sizes. Mixes for terrestrial orchids, which are not discussed in this book, often include other components not mentioned above, such as moss peat, sand and perlite, among others.



Figure 3.21 (above) *Lepanthes inca* has a truly beautiful, shield-like flower that is almost symmetrical along both major axes. This form has a striking, arachnid-like pattern of colouration towards its centre (Grower: Marni Turkel).

Types of Orchid Pot

There are many types of pot that one can use to cultivate orchids in, each with its own advantages and disadvantages (see Table 3.7). A challenge faced by those who grow the tiniest of miniatures is actually finding small pots. If just a few are needed, a good source may be a hobby or craft store; these often sell tiny clay pots for arts and craft projects. Larger numbers of pots can be purchased from commercial suppliers (see *Appendix IV*). The type of pot used is a matter of convenience and personal preference.

Table 3.7 A summary table of the various types of pot suited to orchid cultivation.

Type of Pot	Characteristics	Pros	Cons
Unglazed clay	Comes in various diameters and depths	Porous, helps wick moisture to the outside of the pot Air can penetrate the clay, allowing better root aeration Weight provides stability Relatively inexpensive	Drainage holes are often too small, but can be enlarged with careful drilling; select pots with larger/many drainage holes Algae and slime grows on the moist pot exterior Heavier, bulkier Roots of orchids can adhere to inner and outer surfaces of pots Salts from the mix adsorb upon the clay, resulting in unsightly white crystals on the rim and pot exterior
Glazed ceramic	Comes in various diameters and depths	Decorative and attractive Weight provides stability Not porous, more like a plastic pot	Depending on provenance, glaze or material may contain harmful heavy metals detrimental to plant Potting medium dries out much more slowly than in unglazed pots, easier to overwater Air cannot penetrate pot, reducing availability of air to roots
Plastic	Comes in various diameters and depths Square or round in shape	Holds moisture, good for moist loving plants Easy to clean Inexpensive Often better drainage than clay pots and additional holes can be readily added	Lacks stability, often falling over when watering or when plants become top-heavy Eventually degrades in sunlight, becoming brittle, fading or cracking Plants can be over-watered more easily Not permeable to air, reduced air at the roots, particularly if medium is kept too wet
Net pots	Come in various diameters, depths and mesh sizes	Akin to a self-standing basket Can be suspended for plants with pendent inflorescences Excellent drainage/aeration Small, moisture-loving plants often do well when potted in moss in a net pot and placed inside a slightly larger clay pot	May be difficult to keep moist Need to be watered more frequently Lack any stability and often need to be placed in a larger pot Roots can grow through the mesh and into other pots
Bulb pots and bonsai trays	Come in various sizes Bulb pots are usually round Bonsai pots are usually rectangular	Shallow, good for rambling, creeping or shallow-rooted plants Good for seedlings	Harder to find Of limited use Quality bonsai pots are more expensive Cheaply made bonsai pots may contain heavy metals in the glaze or pot material
Baskets	Can be wood, metal or plastic Come in various sizes and depths	Good for plants with pendent inflorescences (e.g. <i>Dracula</i>) Provide good root aeration Offer more bench space Good for rambling orchids that can attach to the wood baskets	Medium can fall out between slats, so they must be lined with mesh, coconut fibre or moss. Wood baskets eventually deteriorate Hard to remove plants from baskets when repotting; baskets must often be cut

Tree fern pots	Come in a limited number of sizes	Can be used as mounts if turned on their side Allow for good air circulation	Limited growing space within Bulky Not suitable for all orchids; roots of some genera dislike tree fern Breaks down rapidly Inferior pots often fall apart even when new Require more frequent watering
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Repotting Miniature Orchids

All orchids need to be re-potted, and in an ideal world, orchids would be re-potted on a regular schedule. This is not always feasible, particularly where larger collections and busy schedules are concerned. Orchids with the greatest need should therefore be re-potted first. Examples include plants in medium that is starting to break down, plants that have filled their pots, and plants that are starting to grow out and over the edges of their pots. It is very important to re-pot pseudobulb forming species when the plant reaches the edge of its container and new roots appear from the recently matured growth.

When repotting, old media should be removed as thoroughly as possible, taking care to minimise root damage. Dead roots should be trimmed or removed. If there are few or no live roots, it may be best to remove the old velamen and leave the root cord intact to help stabilise the re-potted plant. Rhizome clips can also be used to steady plants with few roots. Pseudobulbous orchids tend to produce roots after the most recent growth has matured. These plants should be re-potted when their fragile roots are less than an inch in length. If the roots are left to grow too long, they may be damaged during repotting, causing the plants to cease growth for a protracted period or even decline. Repotting is also the ideal time to divide plants that have become too large.

It is important to select an appropriately sized container, though it is sometimes difficult to predict the size needed until the plant is unpotted. Generally, it is best to use the next largest pot size, allowing for one to two years of plant growth. It is better to under-pot than over-pot. Never plant any orchid in too large a pot, as this will certainly result in the excess medium staying too wet, becoming anaerobic and eventually causing root problems.

Growers will invariably identify some plants with few or no roots when repotting or remounting. It is advisable to use the smallest pot size possible for plants with poor roots. Once the plant is potted or mounted, it is advisable to spray the leaves (not the roots) with an anti-transpirent product such as “Wilt-Proof”, “Cloud Cover” or “EnvyR”, to reduce further moisture loss.

Perhaps the most important aspect of repotting orchids is to prevent the spread of viruses and other pathogens. It is extremely important to have clean, sterile tools, pots, media and work areas when working with different plants. Start with a stack of newspaper pages, discarding the used sheet between each plant. Sterilise any cutting tools before use, and between plants. The fastest method of sterilisation is by flaming; simply hold the cutting blade over a gas flame for 10–15 seconds. Another method is to soak tools in sterilising solutions, such as 70 % ethanol (commonly used in laboratories, but flammable), 10 % bleach, 3 % hydrogen peroxide, Physan (1 tsp/gal), or saturated trisodium phosphate solution for at least 15 minutes before use, although the latter method requires many sets of cutting tools if working on more than one plant. Another method is to use individual, sterile razor blades for each plant, but this can be wasteful. It is also prudent to wear inexpensive disposable plastic gloves when repotting. Gloves can be disinfected between plants by dipping them into a container of one of the first four sterilising agents mentioned above.

Pots should either be new or, if used, cleaned and sterilised prior to use. Pots can be scrubbed clean in hot, soapy water, or hosed with a jet spray to remove algae, old roots, potting medium and other debris. They should then be soaked for at least 30 minutes in a 10 % bleach solution to kill any pathogens. Bleach solutions should be made fresh on the day that they are to be used. After bleaching, pots should then be rinsed thoroughly in fresh water and air dried. Some growers choose to soak bleached clay pots in fresh water for a day or two before drying to ensure that any traces of bleach are removed.

Labelling Orchids

A mistake often made by novice growers is to discard the tag that came with their first specialist grown orchid. A properly labelled tag will contain important information: the name of the plant, who it was purchased from and when, as well as its potting and division

history. Symbols or abbreviations can also be added for temperature, light and watering requirements. Some vendors use labels that are pre-printed; the ink on these tends to fade, and such labels are often hard to write on. It is therefore useful to make new labels for newly acquired plants. The labels should be made on matte plastic and written on with a pencil (HB to 2H grade); the ink from pens, even from indelible ranges, tends to fade. If a label is breaking or chipping, make a new label immediately. Pushing labels far down into the pot (out of the sunlight) helps them last longer. Some growers put a second label down in the pot as a back-up in case the main label be accidentally lost or removed.

Mounting Orchids

An attractive and space-saving way to grow miniature orchids is to mount them. For a number of rambling or creeping species, mounting is essential. There are lots of suitable substrates, including cork bark, rough-barked hardwood, tree fern plaques, fresh water driftwood, natural or cut slabs or branches of wood such as cedar, manzanita, Australian tea tree, Douglas fir, and even occasionally cactus skeleton. Some orchids prefer to be mounted vertically, whilst others require horizontal rafts. Many miniature orchids will grow much better on mounts than in pots, and some, due to their pendent or rambling habits, will not do well in pots at all. Although the choice of wood used for mounting can also be a local one, only a limited number of species will prove resilient enough in the long term. Using an attractively shaped piece of wood as a mount adds interest and dimensionality to an orchid's display. Other mounting choices include inert materials. The advantages and disadvantages of the different types of mount are summarised in Table 3.8. When mounting orchids, it is best to make a small hole in the label and wire it to the hanger of the mount, or slip it over the wire hanger, either way making sure that it will not detach easily.

Table 3.8 Types of Mounts for Orchids

Material	Types	Pros	Cons
Cork bark	<i>Quercus suber</i>	Rough texture is favoured by most orchids; roots attach easily Relatively available and reasonably priced Comes from renewable sources Lightweight Can be cut or broken into various sizes Can be used for vertical mounts or horizontal rafts Each piece unique Relatively attractive Long-lasting	Dries out rapidly, usually needs daily watering Can become gummy and break down after several years in a greenhouse Various pests such as caterpillars, millipedes, snails and slugs can hide in holes, sides and backs of bark slabs and may not be noticed
Rough-barked hardwood	Many; manzanita (<i>Arctostaphylos</i>), hickory, crepe myrtle (<i>Lagerstroemia</i>), peach (<i>Prunus</i>), apricot (<i>Prunus</i>), cypress bark, tea tree (various <i>Leptospermum</i> spp.), paper bark (<i>Melaleuca</i>), bottle brush (<i>Callistemon</i>)	Relatively available and inexpensive if local Durability variable depending on hardwood species Orchid roots attach to various woods quite readily	Must be replaced when mount starts to rot Some do not hold water on surface, need watering more frequently than tree fern Some only locally available Some types of wood can rot quickly
Tree fern (plaques, totems, balls)	Various species Xaxim (<i>Dicksonia</i> sp. from Brazil) Black tree fern (<i>Cyathea australis</i>) Soft brown tree fern (<i>Dicksonia antarctica</i>) Comes in various shapes, sizes and plaques	Moisture retentive, good for moisture-loving species Soft brown tree fern is easier for orchid roots to penetrate Black tree fern hard to penetrate and roots generally run over the surface	Many species now endangered and generally not sustainably harvested Some to many orchid species dislike tree fern because it is too acidic or remains too wet, roots often will not attach Orchids may do well on this substrate initially, but then decline possibly due to build up of acidity

Wood shingles/plaques, fence paling	Cedar, Douglas fir	Easy to find and can be cut to size Uniformity in shape and thickness, allows growers more plants in a smaller space.	Some other woods may contain resin that discourages orchid roots Material must be tested before adopting widely for orchid mounts
Driftwood (freshwater)	Must be from freshwater sources	Available if you live near lakes, or rivers Available in aquarium stores Can be very attractive	Difficult to know what type of wood it is Some woods can rot quite quickly if self collected
Coco husk fibre plaques	Comes in different sizes	Attractive Some orchid roots will grow vigorously on surface	May need soaking to remove salts
Epiweb and Hygrolon	Comes in precut sizes as well as in baskets, pots, chunks and rolls, even branch shapes	Mimics bark in texture Inert, non-decomposable pH neutral Easy to rinse Epiweb is similar in appearance to tree fern To re-pot or remount, old Epiweb need not be removed; simply place orchid and Epiweb on the new mount or in pot	Does not absorb water; growers find that dipping may work better than spraying for plants mounted on this material Reportedly hard to disinfect and keep clean If growing area walls are made with Epiweb, orchid roots tend to grow right through and attach to the wall, making mount removal difficult Fibres easily cut through roots causing severe plant damage when repotting or remounting Very difficult to cut, requiring industrial scissors or metal saw
Slate, sandstone, terracotta pipes and pot-halves	Terracotta must be unglazed	Can work very well, particularly with lithophytic species, providing there is high humidity and good water quality	Very heavy Algae and moss will readily grow on the surface
Recycled rubber floor matting	Made from recycled shredded tires	Holds moisture when watered, but drains and dries quickly Almost indestructible Resistant to decay and insects Easily cut to size	Not all orchid roots readily attach to this medium Tends to be unattractive Can be expensive

Hygiene

In common with most cultivated plants, orchids are subject to infestation by various insect, bacterial and fungal pathogens. Miniature orchids are particularly vulnerable on account of their small size, and they therefore require careful and frequent monitoring. The first step is simple and prophylactic in nature; keep the orchid growing area as clean as possible. Remove all dead leaves, dead or dying flowers, dried pseudobulb sheaths and dried flower spikes as these can promote bacterial or fungal growth as they decay. It is particularly important to remove all weeds, particularly before they flower and set seed – or produce spores in the case of ferns – from pots and mounts. These may not only harbour viruses and insects, but often compete for water and nutrients through well developed root systems. Various mosses, though attractive, can smother miniature orchids by growing on the plants themselves. These same mosses can also keep plants too wet, or conversely prevent moisture from reaching the roots.

The greenhouse or growing area itself must be kept clean. A greenhouse tends to be the most humid environment in which orchids are cultivated. Wooden benches and posts are particularly prone to rot, algae, moss and even weeds as they age. Algae and moss can also grow on the fibreglass or glass walls of a greenhouse. An application of 10 % bleach solution or Physan (at the recommended concentration) to the walls, floors, benches, trays and windows will go a long way to prevent these problems from developing. These same measures will reduce problems with algae, fungi and bacteria. Keeping your greenhouse or other growing areas tidy, picking up spilled potting material and removing hiding places such as unused pots or mounts will help to reduce problems with slugs and snails, earwigs, pill bugs and millipedes. If a waste container is kept in the greenhouse, ensure that it is emptied frequently.

Another preventive measure to reduce problems with bacteria, fungi and possibly viruses is to ensure that plants are not overly crowded. Room should be allowed between plants, preferably such that the leaves of individual plants do not touch, to allow for sufficient air circulation. The greenhouse or other growing areas should have enough air movement to prevent stagnant pockets of air. As stated previously, if plants are receiving the proper amount of air movement, their leaves and inflorescences should always sway gently when left undisturbed.

Frequent inspection of orchids will prevent nascent problems from developing further. Check plant labels to see when individual plants were last re-potted, and inspect all media for signs of degradation. If plants are not re-potted in time, root rot may develop. When inspecting plants, check the entire plant for damage caused by insects, mites or snails and slugs. It is also important to check the undersides and rims of pots and all parts of mounts, as snails and slugs often hide there. Molluscs can also be found and dispatched at night or in the early morning or at night when they are active. Small insect infestations affecting only a few plants can be dealt with by isolating them, cleaning off the pest(s) with rubbing (isopropyl) alcohol and cotton swabs, then spraying; more widespread infestations require more drastic measures. If mites are detected, it is recommended that the entire collection be sprayed with an acaricide (a pesticide effective against mites and ticks); mites are tiny and mobile, and by the time damage is noted, they are likely to have spread across a large portion of a collection. Note that most insect sprays are curative and not preventative, they are toxic to people and the environment, and thus any steps taken to prevent infestations are better for both your person and the environment. Some of the newer insecticides are absorbed and delivered systemically, and can protect plants for up to a month. Regardless of what insecticide or pesticide used, carefully follow directions, wear protective clothing and use an appropriate breathing device to avoid inhalation of toxic vapours.

When adding new plants to a collection, spraying them thoroughly with an insecticide/acaricide is highly recommended. If possible, isolate them from the rest of the collection for at least two weeks to allow for observation. A second, follow-up spray no less than 7 and no more than 10 days later is highly recommended. If no signs of pests or disease are detected, the quarantined plants can then be introduced to the rest of the plants in the collection.

Diagnosing Ill-health in Orchids

If orchids in a collection fail to thrive, it is usually the result of an underlying issue with the conditions of culture that must be remedied. Stressed plants are more likely to develop fungal or bacterial infections, as well as insect infestations, offering an incentive for the discovery of the causes of ill-health. The environment in which the plants are growing should be examined to ensure that culture requirements for temperature, light, air movement, humidity, watering frequency and water quality are being met. Treating poor growth with increased water and/or fertiliser is discouraged, as these usually makes things worse rather than better.

Root deterioration is the first issue that should be examined for. Whatever the cause, damaged roots create an entry point for disease, and the resulting symptoms may appear first on the more easily viewed parts of the plant, such as the pseudobulbs or leaves. Although it may not be the right time to re-pot the plant, it may be necessary to unpot and examine the roots carefully in order to save it. The condition of the roots can be very informative. For example, black or discoloured root tips may indicate salt build up, rotting roots are a sign of over-watering, and unnaturally short roots can indicate overwatering or excessive fertiliser. Any damaged or rotten roots should be trimmed back to the healthy tissue or removed. The plant should then be soaked for one hour in a proven bactericide/fungicide solution, such as Physan, before repotting in fresh medium.

The condition of the pseudobulbs and leaves can also highlight problems with the growing environment. For example, if the pseudobulbs are abnormally wrinkled, this may indicate water deprivation, possibly from under-watering, but most probably from a loss of roots due to overwatering. Note that the pseudobulbs of some species naturally wrinkle, particularly when blooming, and do so more obviously during their rest period. Newer pseudobulbs may plump up when the conditions are rectified, but this may not occur with older bulbs. If the pseudobulbs are soft or rotten, this may also indicate overwatering; rot may easily spread from the roots to the rhizome and pseudobulbs. Any rotten pseudobulbs should be removed and the cut areas dusted with sulphur powder or another bactericide/fungicide. Cinnamon is a natural fungicide that many have found useful to treat rot on orchids.

Figure 3.22 (facing page) The wonderful sepaline tails of *Masdevallia leonii* sweep back as if drawn by a strong wind. Such dynamic looking flower forms are not uncommon in certain genera of miniature orchid (Grower: Ron Parsons).

The health of the leaves often indicates overall plant vitality. Circular brown, yellow or even blackened patches may be the result of sunburn. As previously stated, sunburn may damage a larger plant, but easily kill a miniature orchid. Rounded black patches develop on some species as a result of mesophyll collapse due to exposure to cold air or water temperatures. Heat stress can cause blackened spots on the leaves, typically towards the leaf tips. Other causes of spotting include fungal and bacterial infections. Leaves that are dark green or limp can signal insufficient light or too much fertiliser. Pale yellow to yellow-green leaves may result from high light, insufficient nitrogen or through natural senescence. Dried or wrinkled leaves may be receiving too much light. Leaves that are red or purple-tinged, or heavily pigmented, may also indicate that light levels are high, but this is generally a natural adaptation and not necessarily damaging. If the leaves start to show signs of odd discolouration, unusual pitting, or silvery, black or red spotting, this could indicate a mite or thrip infestation (see Pests and Diseases).

Leaf loss on non-deciduous species is a serious indicator of plant stress. However, if the roots remain healthy and the culture issues are remedied, the plant may recover. Premature leaf drop can result from nighttime temperatures that are too high, and is a common symptom seen in many cool-growing pleurothallids when they are grown too warm, though it may also result from cold damage. Leaf loss associated with chlorosis, blackened furrows, or ridges may be due to a virus infection. Leaves that are pale, appear desiccated or curl inwards could indicate a fungal infection and/or root rot. Blackened leaf tips are an indicator of insufficient water reaching the ends of the leaves, and can be caused by overwatering and associated root loss, water that is too hard (a high level of TDS), salt build up, over-fertilisation or heat stress. Leaves that have colour breaks, colour streaks, circular or irregular discoloured patterns, pitting or other malformations may all indicate a viral infection. However, yellow, tan or darkened, sunken streaks that occur on new leaves during the early spring may be caused by cold damage. If this is the cause, subsequent leaves should be normal in appearance.

Holes or notches in foliage, particularly the softer new leaves, are a symptom of damage by molluscs (snails or slugs), insects (earwigs, cockroaches, grasshoppers etc.) or even mice. Rats, too, can wreck havoc on an orchid collection, sampling many leaves





Figure 3.23 (above) A single flower of the very pretty miniature, *Cattleya kleberi* (Grower: Ron Parsons).

Figure 3.24 (facing page) The bristly leaves and dark, sombre flowers of *Dresslerella archilae* are as cute as they are fascinating (Grower: Marni Turkel).

and pseudobulbs until they find the tastiest plants which are then quickly demolished. Leaf damage that may rot, usually occurring as consequence of cold, bacteria or fungus, should be removed and the plant treated with powdered sulphur, cinnamon, Physan (1 tsp/gallon) or another bactericide/fungicide.

The length and overall appearance of the inflorescence can also be useful in diagnosing culture problems, although a plant that blooms can generally be considered a happy one. For example, inflorescences that are too long generally indicate lower than optimal light levels, whilst unusually short spikes can be a signal of high light levels. To avoid deformation of the inflorescence or misorientation of the flowers, it is best to avoid altering the position of a plant until all flowers have opened.

The presence, number, condition and duration of the flowers can also be informative to a grower. For example, plants that do not bloom indicate that one or more cultural requirements are not being met; light, water, temperature, humidity and fertiliser levels in any combination may be the cause. Species that require a dry rest may not bloom if they do not receive a rest of sufficient duration, dryness or coolness. Other species respond to changes in seasonal light or temperatures with the initiation of an inflorescence. To ensure good culture conditions, take steps to accurately replicate the conditions that plants would receive in nature. If flower buds begin to form, but then drop, this may be due to the plant being moved, low humidity, low light, excessive temperature fluctuations or temperature shock (such as that caused by watering with cold water), or exposure to ethylene oxide (produced by poorly vented heaters). Flowers that appear malformed may indicate a virus, genetic problems (more common in hybrids), insect damage or exposure to certain pesticides, fungicides or bactericides. Flowers with colour streaks (colour breaks) may signal that the plant is infected with a virus. Fine blackish or brownish spotting often occurs as a result of fungal infections like botrytis, caused by inadequate air movement, high humidity and/or watering, or misting too late in the day.



Pests and Diseases

Aphids

Aphids, sometimes known as plant lice, are obnoxious worldwide plant pests that occur in both tropical and temperate climates. In cultivation, they may appear year round, though in temperate regions they tend to be most problematic in late winter and early spring, and sometimes again in autumn. Aphids are found on many garden plants, infesting ornamental plants, particularly roses, as well as vegetables. There are over 4500 species of aphid, and at least 80 are known to be pests on crops and ornamentals. They are often green in colour, although some species can be grey, white, yellow-orange, brown or black. Aphids have six legs, in common with all insects, and one pair of antennae. The body is pear shaped. Aphids can reproduce by parthenogenesis (asexually) and as a consequence, a population can establish and increase rapidly from just one individual. Their sucking mouthparts penetrate plant cells, allowing them to extract nutrient rich fluid from their hosts.

The small mouth parts of the aphids cannot penetrate any but the most tender plant tissues, such as new leaves, buds and flowers. Moreover, aphids generally prefer softer plants, including houseplants such as begonias and gesneriads, or weeds under the benches in a greenhouse. Aphids secrete honeydew, which promotes the development of sooty mold. Areas of dead tissue and distortion develop as plant tissues grow around areas of damage. Heavy infestations cause generalised yellowing, distortion of blooms and drying. If ants are present in a growing area, one must be on alert for aphids; ants are well known for their “farming” of aphids, tending and milking the honeydew from them as we do dairy cows. Although most aphids are wingless, winged individuals will develop and migrate to form new colonies. Winged aphids can easily enter an orchid collection from the garden through open vents or doors, and readily cling to clothing. To prevent aphids from entering a growing area from the outside, cover all vents with a fine mesh. If unnoticed, aphids will multiply extremely quickly; it is therefore essential that they be eradicated immediately. Importantly, and of particular importance to those who grow orchids in the Pleurothallidinae (such as *Masdevallia*, *Dracula*, *Pleurothallis*, *Lepanthes*), aphids are vectors of Bean Yellow Mosaic Virus (BYMV).

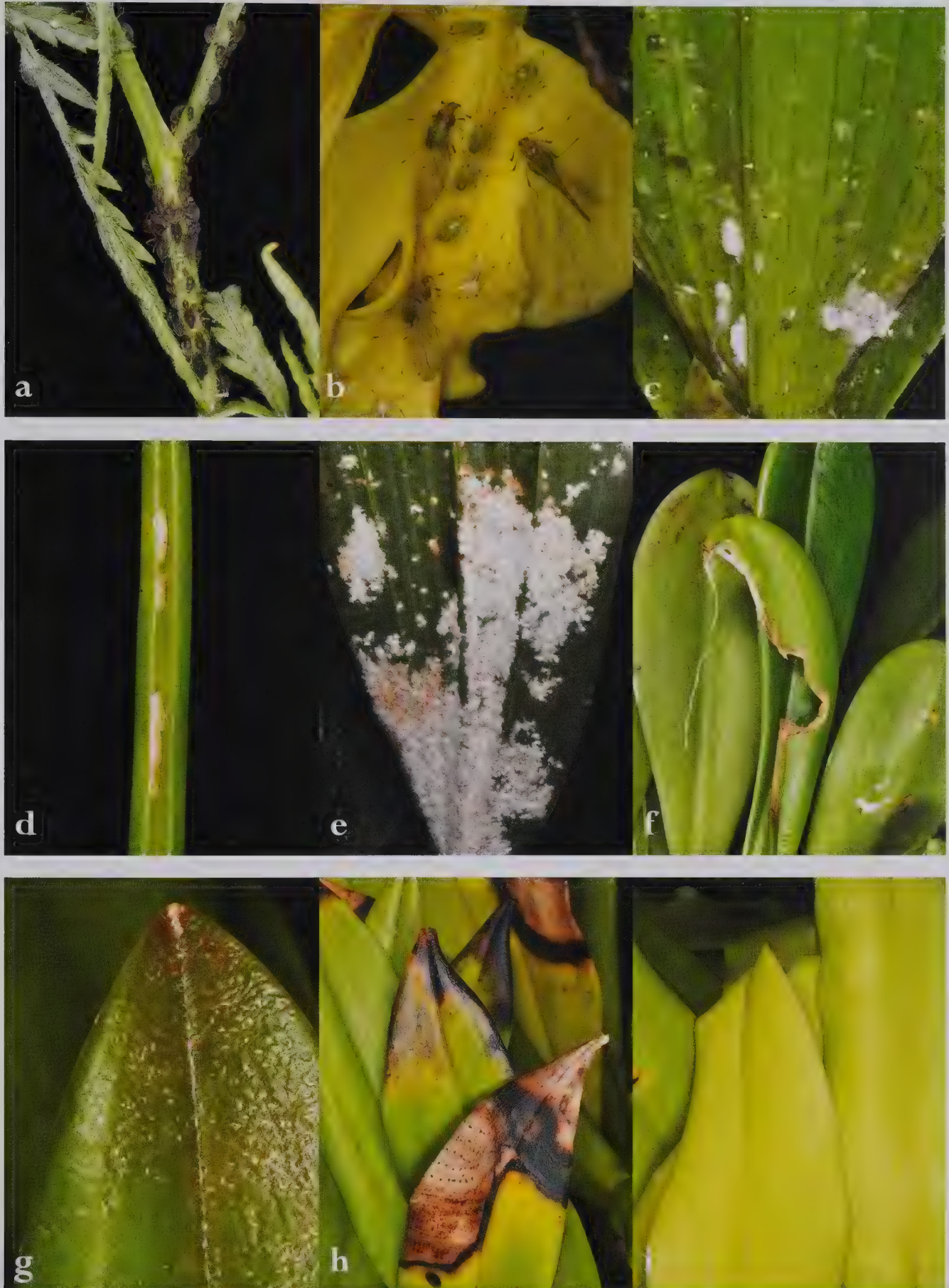
BYMV can be devastating to a collection, and any plants infected with it should simply be destroyed to prevent further spread. The only exceptions to this would be extremely rare and irreplaceable plants. These should be quarantined, treated, and then propagated by seed.

A small aphid infestation can be dealt with by cleaning affected plants with insecticidal soap, or with a 70 % isopropyl (rubbing) alcohol-soaked cotton ball. Even so, a thorough spraying of the entire collection is recommended. Each plant treated should be thoroughly soaked with insecticide. Not all insecticides are suitable for orchids, and they can disfigure blooms if used on newly developing or open flower spikes. It is worthwhile to check with local growers and orchid hobbyists to see what insecticides they are using to control aphids and other insect infestations to avoid any toxic effects.

Aphids can be managed with biological controls, including ladybirds (ladybugs), lizards and frogs, but if growing pleurothallids, this approach is too risky. It only takes one aphid infestation that carries the BYMV to devastate a collection, resulting in the loss of irreplaceable plants. Some of the newer insecticides act systemically, and offer long-term effective control of aphids, therefore minimising the need for follow-up spraying.

Figure 3.25 Orchid pests and conditions (facing page)

- | | |
|--|-----------------------------|
| (a) black aphids (with an attending ant) | (f) snail or slug damage |
| (b) green aphids (note the presence of spreading winged forms) | (g) spider mite |
| (c) mealy bugs | (h) fertiliser burn |
| (d) soft scale | (i) excessive light levels. |
| (e) Boisduval scale | |



Scale Insects

There are at least 27 species of scale that can infest cultivated orchids. Most are soft scales, also called brown soft scale or hemispherical scale. These insects spread quickly and can be difficult to control. One of the most damaging of all insect pests is Boisduval scale (*Diaspis boisduvalii*) which seems to prefer orchids of the *Cattleya* (Laeliinae) and *Oncidium* (Oncidiinae) alliances, although they are found on other orchids also. Boisduval scale insert long, threadlike mouthparts into host plants, with which they extract sap; this causes stippling and pitting of the leaves. Moreover, the scale also inject toxic saliva rich in enzymes whilst they feed, and this results in cell death. Boisduval scale produce honeydew as a waste product which, in common with aphids, also attracts ants. The damage caused by this scale can become quite severe before it is even noticed as the organisms tend to infest pseudobulbs beneath the sheaths as well as on the undersides of leaves. Affected plants can be seriously debilitated or even killed.

Most scale species are immediately recognisable in the adult stage as pale yellowish to greenish-brown, tan or dark brown oval to circular bumps that show up on leaves, pseudobulbs, inflorescences, petioles and occasionally flowers, rhizomes and roots. The adult forms of most species are protected by a tough shell, beneath which they are able to suck sap and reproduce. This protective shell makes them more difficult to kill than aphids. Mature females of Boisduval scale are typically round, flat, cream to whitish in colour and do not cluster together. The oval-shaped males typically form masses with a white cottony appearance similar to that of mealy bugs. The males tend to cluster on the undersides of leaves, along the mid-veins of the dorsal side of leaves, and in the grooves along pseudobulbs and leaf axils. The immature forms of all scale species are tiny and yellowish to pinkish; they are not easily seen without a hand lens and are able to move from plant to plant. The most common means of introducing scale is through acquisition of an infested plant. Colonisation from nearby plants can also occur when insects are carried on the air currents generated by fans.

Most scale are relatively easily controlled; they can be removed by spraying with a jet of water, or by swabbing with isopropyl alcohol-soaked cotton balls, both followed up by spraying with an insecticide. Boisduval scale is less easily treated; infested plants require diligent cleaning. All dried plant sheaths and bracts should be removed, and all visible scale knocked off with a jet of water, before being allowed to dry. More delicate plants can then be cleaned with a solution of 70 % isopropyl alcohol and cotton swabs, cotton buds or a soft toothbrush, making sure that all scale is dislodged and removed. The plants should then be thoroughly treated with a systemic insecticide. It is important that this treatment be repeated between 7 and 10 days later, and again at similar intervals until all scale is gone. Repeated applications over this interval period help to ensure that re-infestation by previously unhatched juveniles does not occur. Once the insects have formed their protective scale, they are impervious to most pesticides. Unfortunately the large yellow spots and other damage that they form on leaves and pseudobulbs is permanent.

Fungus Gnats

The term fungus gnats encompasses a variety of different species. They appear as tiny, buzzing, slow-flying blackish flies with translucent wings and can be quite prolific at times. They feed on the organic material in potting mix, but they have been known to gnaw on the young root tips of orchids. Fungus gnats can be eliminated by the same insecticides that kill mealy bugs, aphids and scale insects, but since they live in the potting mix and moss on mounts, it is important to make sure that the insecticide thoroughly soaks the mix or mount. Other ways of control these bugs includes the use of sticky traps and carnivorous plants, particularly *Pinguicula* (Lentibulariaceae) in your growing area. Keep in mind that *Pinguicula* do not tolerate the fertiliser enjoyed by neighbouring orchids since they occur on nutrient poor soils in the wild. If an infestation is severe, spraying is recommended, as traps and carnivorous plants can only reduce, not eliminate, the problem.

Mealy Bugs

Mealy bugs are a serious pest that can prove very difficult to control. If mealy bugs are discovered in a collection, one must act immediately as a small problem can quickly become a large one. There are over 200 different species of mealy bug known in North America alone, though it seems that only a few are found on orchids. These close relatives of scale can be recognised by their usually white or whitish-grey colour, cottony appearance, and oval-shaped, segmented body. A number of species exhibit 2–4 long, tail-like filaments. Through their feeding, mealy bugs weaken plants, causing loss of leaves and flowers. In addition, they secrete honeydew, which in turn attracts ants and encourages the development of sooty mould. These insects can be found on all plant parts, and individual insects will migrate from plant to plant. They are also able to move into potting media and attack rhizomes and roots. Additionally, they may be found under pots and trays and in cracks on benches. A rapid means of reducing a mealy bug population, once spotted, is to swab or spray plants with isopropyl alcohol (70 %) containing a small quantity of mild dish soap. Rub the bugs off

with an alcohol-soaked cotton ball or swab, or a soft toothbrush, making sure that the entire plant is covered, and clean all nooks and crannies. With severe infestations, some people recommend repotting infected plant(s), first cleaning off any potting medium that remains and then washing the roots under a gentle stream of lukewarm tap water. Application of a systemic insecticide formulated for ornamental plants is then recommended, once all dried sheaths and bracts have been removed, making sure that all plant parts are treated. The pot and medium or mount and moss should also be flushed thoroughly. Repeat insecticide treatments 7–10 days later. It is wise to spray plants prophylactically on occasion, as a grower may have a root mealy bug infestation and not be aware of it.

Thrips

There are over 250 species of thrip in North America, and of these, a number are known to infest orchids. Thrips are a problem for growers everywhere, but in some regions they seem to be more prevalent. These tiny (up to 5 mm long) sucking insects are mostly difficult to see without a hand lens, and attack both the woody and soft tissues of plants. Like aphids, these insects can spread viral, fungal and bacterial infections. In orchids, their damage is easily detected and most often seen as damaged flowers and injured foliage. Leaf damage can include chlorotic spots, sunken, blackened or silvery areas, wilting of tissue and loss of leaves. Flowers often brown prematurely, and can have spotted, streaked, silvery or discoloured segments. A severe thrip infestation can kill an orchid, and miniatures are particularly susceptible. Thrips can travel from plant to plant and can introduce and spread viruses throughout an orchid collection. Good sanitation is the first defence, and some growers use blue or yellow sticky traps to monitor for thrips. On these, thrips appear as small dark specks. One can also place a sheet of white paper beneath a suspect flower or leaf and shake the plant. The red, yellow, brown or even banded thrips will fall onto the paper. If found, the plant and possibly the entire collection should be treated with insecticide; eggs, nymphs and larvae are likely to be present on surrounding plants. Treatment should be carried out at least twice, one week apart, to kill successive generations.

Mites

Mites (spider mites, false spider mites, *Phalaenopsis* mite and others) are another group of serious pests that will cause significant damage to an orchid collection. Mites are not insects, but arachnids, and are more closely related to spiders and ticks. Not all mites are problematic; some are carnivorous and eat insects and other mites. However, problem mites do attack many species of orchid by puncturing plant cell walls and sucking out fluids and chlorophyll. Because of this feeding style, they may also act as disease vectors. A false spider mite, *Brevipalpus californicus*, is known to be a vector of orchid fleck virus, a virus that infects many orchid species. Mites also create holes in the leaves that can lead to severe dehydration. The damage is often not seen until it becomes severe as it tends to occur on the undersides of leaves. A silvery sheen, yellow speckles, browning of leaves, and silk-like silver webbing are signs of a mite infestation. The silvery sheen may eventually become sunken and brown. Frequent use of insecticides may actually promote mite infestations since mites are not killed by insecticides, whereas their predators and natural controls often are. Mites readily move between plants, floating on air currents, so they can readily and quickly spread throughout a collection. Most often they are introduced into collections via infected plants.

Preventative measures to discourage mites involve regularly spraying plants with water, which helps to remove them from the surface. Mites reproduce quickly in warm, dry weather, and moist conditions deter them somewhat. Rubbing alcohol (70 % isopropyl) with a few drops of mild dish soap on a cotton ball or swab will help control a small problem, but for optimal control, spraying with an acaricide (pesticides effective against mites and ticks, commonly called miticides) is recommended. The acaricide should be labelled for ornamental plants, and the concentration used should be that recommended on the label. Additionally, due to the life cycles of mites, it is essential that affected plants be treated at least twice, if not three times, between 7 and 10 days apart. This will kill off the adults and newly hatched young that were not killed by the previous applications. As for aphids and their insecticide treatments, it is a sensible to rotate between different acaricides between infestations to prevent emergence of resistant populations.

Insecticides and Acaricides

Effective insecticides and acaricides for various pests are listed in Table 3.9. Both active ingredients and some common trade names are listed. It is important to read the labels of commercial brands in order to determine what the active ingredients are. Different countries and regions will offer different pesticides according to local regulations. Some pesticides can be quite damaging to orchids and other ornamental plants, and any insecticide solutions that are not labelled for ornamental plants should be avoided; these often contain damaging solvents as part of the formulation. Consulting other local growers about effective orchid treatments is highly recommended. Whatever products are selected, closely follow the manufacturer's recommendations for concentration and appropriate personal safety protection. If growing orchids indoors, it is best to move them out of the living area to spray them, or if this is not possible, spray them in a well ventilated area. Insects and mites readily develop resistant strains to regular use of particular insecticides or acaricides, so it is valuable to rotate between pesticides with different modes of action.

Table 3.9 Pesticides useful in the control of aphids, mealybugs, scale, thrips and mites.

Active Ingredient (Trade Name)	Target Pest(s)
Acephate (Orthene)	Insects (aphids, scale, mealy bugs, thrips, ants)
Avermectin (Avid)	Mites
Azadirachtin A&B (Azamax)	Insects (aphids, scale, mealy bugs, thrips, ants), mites, molluscs (slugs and snails)
Bifenthrin (Talstar)	Insects (aphids, scale, mealy bugs, thrips, ants)
Carbaryl (Sevin)	Insects (aphids, scale, mealy bugs, thrips, ants)
Diazinon	Insects (aphids, scale, mealy bugs, thrips, ants)
Dinoteferin (Safari)	Insects (aphids, scale, mealy bugs, thrips, ants)
Fluvalinate (Mavrik)	Insects (aphids, scale, mealy bugs, thrips, ants)
Imidacloprid (Marathon II, Merit, Provado,)*	Insects (aphids, scale, mealy bugs, thrips, ants)
Imidacloprid, tau- or (2R)-Fluvalinate, Tebuconazole combination (e.g. Bayer Advanced 3-in-1)*	Insects (aphids, scale, mealy bugs, thrips, ants), mites
Malathion	Insects (aphids, scale, mealy bugs, thrips, ants)
Methiocarb	Insects (aphids, scale, mealy bugs, thrips, ants), mites, molluscs (slugs and snails)

*Neonicotinoid-based pesticides may be linked to declines in insect pollinators such as bees, and their use has been banned in the European Union.

Slugs and Snails

Slugs and snails are the nemesis of orchid hobbyists around the world. They favour tender plant tissues, but seem to gravitate towards the buds of the rarest of plants first! Snails and slugs are generalists and will feed on plants, algae and fungi. They shelter and lay their eggs in and under pots, under benches and in the cracks and seams of greenhouses – that is, anywhere that is dark and moist. Some species live exclusively within potting media. There are a number of different types of snail that can cause problems with orchids. The English garden snail (*Helix aspersa*) and the garlic and bush snails (*Oxychilus alliarius* and *Zonitoides arboreus* respectively) are three of the most prevalent in collections, although other snail species are occasionally found also. The giant African land snail (*Achatina fulica*), although not a pest in temperate collections, has been introduced around the world in tropical areas, where it is a major pest when present. The garden snail is about 2.5–3 cm long (shell length), very common (found almost worldwide), and often found eating leaves and flowers or grazing on algae on greenhouse walls. These are easy to dispatch underfoot. The insidious bush snail is another matter entirely; these molluscs are approximately 5 mm in diameter, with a flattened, discoid brown shell. Rarely seen, they may be found on the roots and surface of pots in the evening or early morning. The bush snail is particularly damaging to root tips, but will also chew flowers and other softer plant parts. The garlic snail is so-named due to the fragrance emitted when crushed; these tiny pests can found in surprising numbers once detected. They are very difficult to eradicate. The field slug (*Deroceras reticulatum*) and marsh slug (*Deroceras laeve*) are two of many shell-less molluscs that can proliferate in and severely damage miniature orchid collections. All of these problematic molluscs can be dealt with in a similar fashion.

There are many biological control methods suited to the treatment of mollusc infestations, including diatomaceous earth and caffeine, and these are used with varying degrees of success. The practice of placing saucers of beer on the floor and benches can be surprisingly effective, as snails and slugs, with their penchant for a good brew, are attracted to the yeasty scent of beer; they simply crawl in and drown. Inspecting a growing area at night using a flashlight is often a good way of finding and physically removing these pests. Pieces

of melon, such as cantaloupe or honeydew, are slug magnets and can be placed in the growing area. At night or just before dawn, pick up the melon, slugs and all, and discard or destroy it. Some growers use copper tape as a barrier to molluscs; it holds a small electric charge that repels them. However, the tape only works if it is clean and not covered with algae, moss or dirt. There are also effective chemical controls, the most widely used of which contain metaldehyde. These come in different forms, including liquid, granular and bait formulations. If children or pets have access to your orchid growing area, metaldehyde should not be used as it is very toxic. There are also anti-mollusc products that contain iron phosphate; these formulations are non-toxic to animals. Although useful in the garden, their efficacy in orchid protection is debatable; snails or slugs must come in contact with it the product, but it cannot be placed directly in pots or on mounts.

Bacterial, Fungal and Oomycete Infections

There are numerous difficult to identify bacterial, fungal and oomycete (fungus-like microorganisms, often called water-moulds) infections capable of affecting an orchid collection. Determining the nature of the problem is difficult in itself and beyond the scope of this work. There are a number of comprehensive publications that deal with orchid diseases (see *Appendix IV*). The diseases that produce rot are the most serious, and these are briefly discussed here.

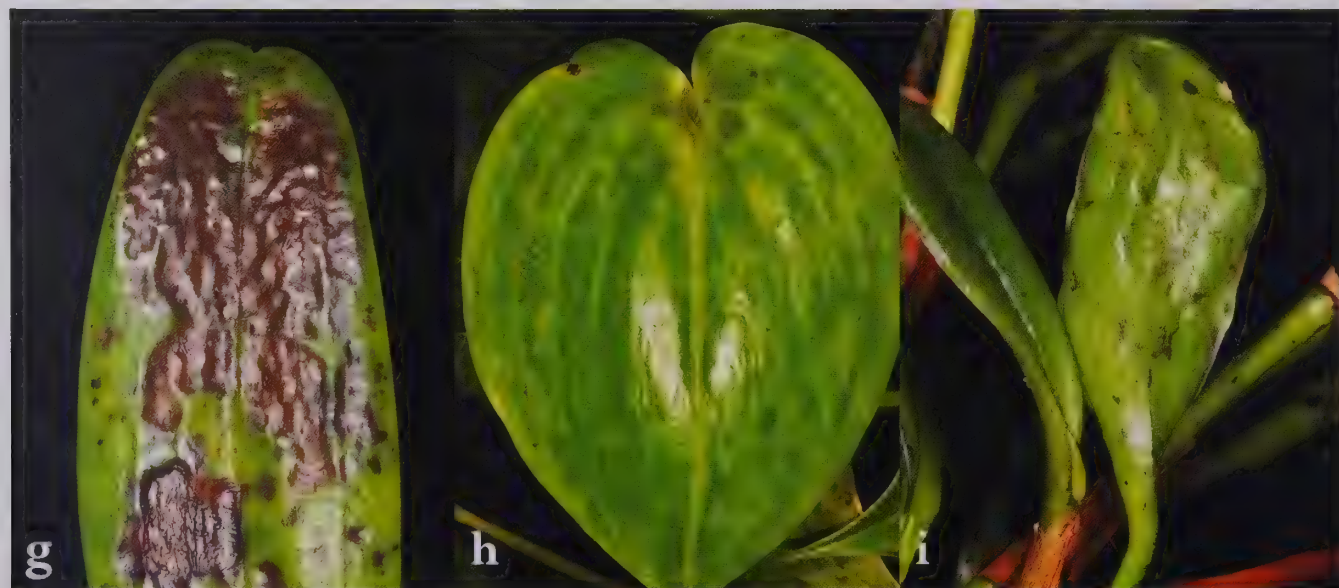
Although not strictly a winter or cold season issue, the appearance and spread of rot caused by fungal diseases is facilitated by lower temperatures, wet foliage and high humidity. Warm temperatures, high humidity and low air movement can also favour the spread of a number of bacterial and oomycete infections such as those caused by *Erwinia*, a bacterium, *Phytophthora* and *Pythium spp*, both oomycetes. These diseases are contagious, can spread quickly, are potentially lethal and should be dealt with immediately. Symptoms of these infections generally appear as soft, sometimes wet, dark spotting on the leaves, but can appear anywhere on the plant. Some species are much more susceptible to such infections than others; including soft-leaved plants of the *Oncidiinae*, *Pleurothallidinae* and some *Dendrobium*.

Disease can be spread by several different means, including physical contact by affected plants, splashing of water from an infected plant to a healthy one, infected tools or cutting implements, air movement, or even human touch. Microorganisms multiply on wet surfaces, and if leaf surfaces remain wet for prolonged periods, these organisms can infect plants. Prevention thus involves ensuring that foliage dries after watering, keeping plants well spaced and ensuring good ventilation, all of which are key. As previously mentioned, it is imperative that dying or dead flowers, leaves, sheaths and bracts are removed, as bacteria and fungi are integral to natural decay. Good hygiene must always be exercised in the growing area.

If a single plant is infected, it should be removed from the growing area and treated away from the rest of the collection. Cut off infected leaves or leaf parts and remove infected pseudobulbs or growths. When cutting, ensure that all of the infected tissue and some of the adjacent healthy tissue is removed, then treat the entire plant with a fungicide. If rot is still present in a cut, make sure that the tools are sterilised before making another cut. Should disease be more widespread, again remove all diseased tissue and follow by use of a fungicide across the collection. Suitable fungicides in the United States include Physan, Dithane M-45 wettable powder, Subdue and Cleary's 3336. Sulphur powder and powdered cinnamon can be used for spot treatments. There are some highly toxic fungicides available, so it is important to study the labels carefully before selecting one. Surfaces in the growing area can be decontaminated with a 10 % bleach solution or Physan. If excessive humidity is an issue, consider purchasing a dehumidifier. Although expensive to operate, just one of these units can lower and maintain humidity at an acceptable level.

Viral Infections

Viral infections are incurable, and unfortunately, the only sure treatment is to remove and destroy affected plants. Almost all growers have had plants that are infected by viruses at one time or another, and it can be painful to dispose of a favourite orchid that has succumbed to one. Viruses can be introduced into a collection by various means, such as the purchase of an asymptomatic plant, insect vectors, cutting tools, pots, mounts or hand transfer. Recognising viral infections can be difficult; some plants will have no symptoms at all, whereas others will have leaves with one or more symptoms including concentric rings or spots, sunken black spots or streaks, yellow or black streaks or flecks, elongated streaks of dead tissue, colour breaks, irregular leaf margins, or flowers with colour breaks. If a plant is suspected of having a virus, separate it from the rest of the collection and have it tested if possible. Companies specialising in testing for viruses as well as do-it-yourself test kits both exist (see *Appendix IV*). There are at least 30 different viruses that can infect orchids; of these, *Odontoglossum* Ringspot, *Cymbidium* Mosaic and Bean Yellow Mosaic viruses are the



three most likely to be encountered as they seem to be the most prevalent in collections. Bean Yellow Mosaic virus is spread by aphids and possibly thrips, and is most often found in pleurothallids that are grown out doors. The most common cause of viral infection is the grower, often via use of contaminated tools or pots, or transfer by hands, as when repotting an asymptomatic infected plant.

The best treatment against viruses is prevention. Wash hands with warm water and soap after handling each plant. When repotting, follow the guidelines described above. Never on any account reuse any potting material (including media, pot shards, styrofoam peanuts, mounts, wooden stakes), except for pots or metal stakes that have been sterilised. Viruses are most easily transferred by plant fluids, and the possible transfer of these from one plant to another must be avoided. Plants may appear symptom-free yet still harbour viruses, and infected plants may not exhibit any symptoms for a long time after the initial infection, if at all. The disposal of infected plants is the only way to ensure against the threat of further spread.

Supplies

Finding supplies for miniature orchids can sometimes be challenging. Companies that specialise in hydroponics are an excellent source of fans, heaters, lighting equipment, light meters and sundry other equipment and supplies that might otherwise be difficult to locate. Many nurseries and hardware stores will also carry many of the items needed to maintain a collection. The internet is now one of the best resources through which suppliers can be identified. Many small, ornamental house plants grow well under lights, and several companies specialise in supplies and equipment for such plants. Several sources are referenced in *Appendix IV*, but search engines such as Google will yield results that are more specific to your region.

Figure 3.26 Orchid weeds and diseases (facing page)

- | | |
|---|---|
| (a) weeds — <i>Cardamine</i> L. (Brassicaceae), bitter cress | (f) sunburn |
| (b) weeds — ferns, various taxa | (g) heat damage |
| (c) weeds — <i>Oxalis</i> L. (Oxalidaceae), wood sorrel or false shamrock | (h) viral infection (Bean Yellow Mosaic), note colour break |
| (d) moss creep, various taxa | (i) viral infection (Bean Yellow Mosaic), note irregular leaf margin, misshapen leaf, colour break. |
| (e) bacterial or fungal infection | |

Acianthera Scheidw.

Publication: Scheidweiler, M. J. F., 1842, *Allgemeine Gartenzeitung* 10: 292

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Acianthera recurva* (Lindl.) Pridgeon, A.M. & Chase, M.W., 2001, *Lindleyana* 16: 246.

Etymology: From the Greek *akis*, meaning point or beak, and *anthera*, anther.

Heterotypic synonyms: *Cryptophoranthus* Barb.Rodr., *Brenesia* Schltr., *Geocalpa* Brieger, *Sarracenella* Luer, *Didactylus* Luer, *Unquella* Luer, *Arthrosia* (Luer) Luer, *Dondodia* Luer, *Ogygia* Luer.

Profile: This large genus of approximately 220 creeping, epiphytic, lithophytic or occasionally terrestrial species is found in Mexico, Central and South America, and the Antilles. They occur at elevations of 250–2600 m, where they grow in humid, cloud, evergreen and dry forest habitats, often near river banks or streams. Most of the species are found in Brazil.

General plant morphology: Sympodial, slowly creeping, repent or pendent, with terete or laterally compressed stems, lacking an annulus. *Inflorescence* arising from apex of ramicaul. *Flower* fleshy, often externally pubescent, lateral sepals connate for part of their length (at least to the middle, and in some species connate to form a tube), petals short, labellum thick, column foot short and thick, pollinia 2.

General culture notes: *Water* with good quality water and fertilise at half strength weekly. For those collections grown in areas that experience winters with short day length and low light conditions, fertilisation should be reduced to quarter strength, twice a week during the winter. All species in this genus, as for most pleurothallids, are prone to bean yellow mosaic virus (BYMV). Good aseptic technique should be used when repotting and care should be taken to prevent aphid infestations, as aphids are the vectors for BYMV. All of the species can be propagated by division or seed. These species do not typically have a dormancy.



Figure 4.1 (above) The curious, hooded blooms of *Acianthera bragae* (Grower: Hanging Gardens).

Figure 4.2 (facing page) *Acianthera bragae* (Grower: Judy Carney).



ACIANTHERA

Acianthera bragae (Ruschi) F.Barros

Publication: *Hoehnea* 30: 183 (2003)

Etymology: *Acianthera bragae* was named in honour of Dr. Pedro Ivo Soares Braga, a botanist who worked for many years with orchids from the Amazonian region.

Homotypic synonyms: *Physosiphon bragae* Ruschi.

Heterotypic synonyms: *Physosiphon pubescens* Barb.Rodr., *Phloeophila pubescens* (Barb.Rodr.) Garay, *Sarracenella pubescens* (Barb.Rodr.) Luer, *Pleurothallis sarracenia* Luer, *Acianthera sarracenia* (Luer) Pridgeon & M.W.Chase.

Morphology: Plant to 2.5 cm tall, creeping, mat forming, branching often, ramicauls spaced to 0.5 cm apart. *Ramicaul* to 0.2 cm long, erect, enclosed in sheaths. *Leaf* 1.5–2.4 cm long by 0.5 cm wide, sessile with an acute apex, narrowly ovate or obovate, V-shaped channel on dorsal side, thick, succulent, leathery, rigid, often suffused with purplish red blotches or spots. *Inflorescence* a raceme, extremely abbreviated, nearly sessile, erect. *Flower* 1.5–2 cm tall, 2 (occasionally 1, rarely 3) in number, simultaneous, resupinate, tubular, sepals connate along entire length, hooded, inflated towards the apex, facing inward.

Range, elevation and habitat: From southeast Brazil (states of Minas Gerais, São Paulo, Rio de Janeiro, Paraná and Santa Catarina). In Rio de Janeiro state it occurs at elevations of 700–1000 m, where it is locally common, growing epiphytically in humid, primary montane cloud forest on shady trunks, branches, and rotten wood, usually not more than 5 m from the forest floor. This species usually flowers between summer to early autumn in nature.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern. This species is best suited to mounts, but if potted, use a shallow pot with moisture retentive media, such as New Zealand *Sphagnum* moss. *Temperature* intermediate to intermediate-cool. *Light* light shade. *Watering* keep moist, well-drained, neither wet nor soggy. *Humidity* high. *Air movement* good. *Pests and diseases* see general notes for this genus.

Comments: An attractive, mat forming species, with endearing flowers that have been called “kissing slugs”. The flowers of this species differ from those of the very similar species, *Acianthera asaroides*, by having flared sepal apices. The plants are virtually identical when not in bloom. The flowers of *A. asaroides* are slightly larger and have incurved sepal tips, forming a small opening, and tend to bloom in cultivation in late winter through spring. Plants of this species are particularly impressive when grown to specimen size.



Figure 4.3 (above) *Acianthera bragae* flowers, affectionately referred to as kissing slugs (Grower: Cindy Hill).

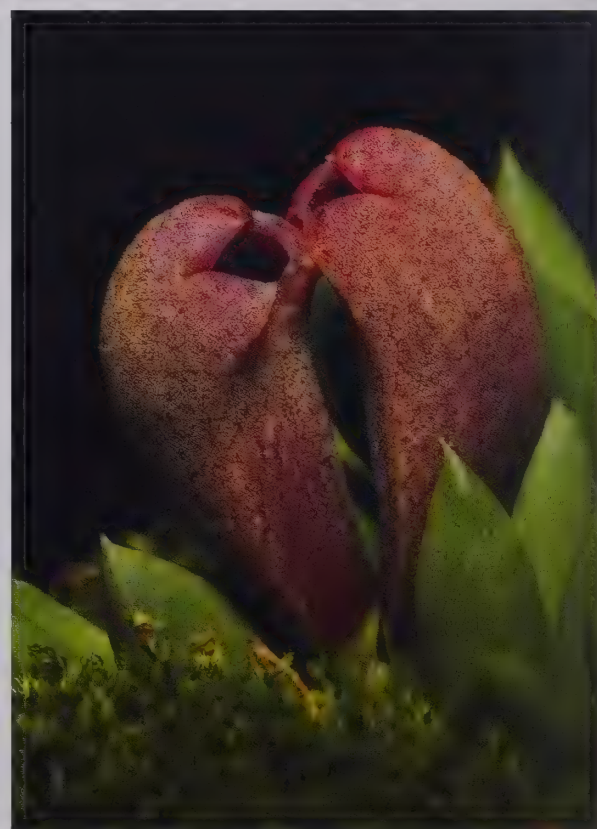


Figure 4.4 (above) The flowers of *Acianthera asaroides* are similar, but nonetheless distinct (Grower: Howard Gunn).

ACIANTHERA

Acianthera crinita (Barb.Rodr.) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 243 (2001)

Etymology: From the latin *crinitus* (hairy), referring to the flowers

Homotypic synonyms: *Pleurothallis crinita* Barb.Rodr., *Lepanthes crinita* (Barb.Rodr.) Barb.Rodr., *Specklinia crinita* (Barb.Rodr.) F.Barros, *Pabstiella crinita* (Barb.Rodr.) Luer.

Heterotypic synonyms: *Lepanthes renipetala* Barb.Rodr., *Pleurothallis renipetala* (Barb.Rodr.) Cogn., *Pleurothallis renipetala* var. *grandifolia* Cogn., *Pleurothallis renipetala* var. *intermedia*, *Cryptophoranthus kautskyi* Pabst, *Acianthera renipetala* (Barb.Rodr.) Luer.

Morphology: Plant less than 2.5 cm tall, prostrate, creeping, mat forming, branching, leaf essentially parallel to the substrate, alternating at intervals of about 0.5 cm. *Ramicaul* 0.8–1.2 cm long, ascending, thin, cylindrical, enclosed in sheaths. *Leaf* 2–3 cm long by 1.5–2.5 cm wide, sessile, flattened, obovate to nearly orbicular, apex rounded, lamina leathery, rigid, with distinct, purplish spotting on both sides. *Inflorescence* a raceme, shorter than leaf, up to 2.4 cm long, congested, spreading to slightly ascending. *Flower* 0.7–0.9 cm long, up to six (rarely more) in number, simultaneous, resupinate, hirsute, barely separating, lateral sepals forming cup-like synsepal.

Range, elevation and habitat: An uncommon species, *Acianthera crinita* is found in Bolivia (department of Santa Cruz, 1800–2000 m) and Brazil (states of Minas Gerais, São Paulo and Paraná, ~700 m), where it grows epiphytically in deciduous, semi-humid montane forest and very humid primary montane cloud forest on middle to lower branches and tree trunks, and also on lianas. In nature, this species blooms in the summer (February, one record).

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern. Not suited to pot culture due to its mat forming habit. *Temperature* intermediate to intermediate-cool. *Light* bright to medium shade. *Watering* moist but not wet. *Humidity* high. *Air movement* gentle, constant.

Comments: Plants of this species are extremely attractive, if slow-growing, with wonderful, almost round, purple-spotted leaves that hug the substrate, and charming, fuzzy flowers that do not spread widely. While not commonly seen in cultivation, *Acianthera crinita* is well worth seeking out. It is possible to find this species under the synonym *Pleurothallis crinita*. In cultivation, *Acianthera crinita* tends to bloom from late spring into summer.



Figure 4.5 (above) The attractive leaf and blooms of an *Acianthera crinita* plant (Grower: Hanging Gardens).



Figure 4.6 (above) A mass of hirsute *Acianthera crinita* flowers makes for a delightful display (Grower: Marni Turkel).

ACIANTHERA

Acianthera leptotifolia (Barb.Rodr.) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 244 (2001)

Etymology: From the Greek *lepto* (slender) and Latin *folium* (leaf), having leaves like those of *Leptotes* (Orchidaceae).

Homotypic synonyms: *Pleurothallis leptotifolia* Barb.Rodr., *Specklinia leptotifolia* (Barb.Rodr.) F.Barros, *Pabstiella leptotifolia* (Barb. Rodr.) Luer.

Morphology: Plant to 2.5 cm tall, creeping, mat forming, branching frequently, with close-set growths. *Ramicaul* to 0.4 cm long, cylindrical, erect, enclosed in sheaths. *Leaf* 1.5–2.5 cm long by 0.4 cm wide, sessile, linear, apex obtuse, apiculate, lamina erect, suberect or obliquely erect, semi-terete, with narrow groove on dorsal surface, leathery, succulent, sometimes with purple spotting. *Inflorescence* a raceme, 3–3.5 cm long, ascending to erect, secund, terete, glabrous, filiform, arising from the ramicaul. *Flower* 0.3–0.4 cm tall, up to 3 in number, not widely spreading, yellow colouring variable in intensity.

Range, elevation and habitat: A rare species from southern Brazil (states of Minas Gerais, Espírito Santo, São Paulo, Rio de Janeiro, and Rio Grande do Sul), found at elevations of 900–1000 m where it grows epiphytically. It can grow to form large colonies in old trees, and is also found on the upper branches of relict trees in disturbed areas.

Culture recommendations: *Substrate* mount on cork bark, possibly on tree fern with a little moss. Not well suited to pot culture. *Temperature* intermediate to intermediate-cool. *Light* bright diffused to medium shade. *Watering* keep moist and well-drained, but not wet. This species is tolerant to drying out for short periods. *Humidity* high. *Air movement* good.

Comments: With succulent leaves reminiscent of small bananas planted in erect rows, this popular species has attractive, pale to bright yellow flowers that dance enticingly above the leaves. Specimens in full bloom make for an impressive display. This mat forming species branches freely. Parts of the plant will grow off the mount, hanging in mid-air with abundant roots, making it easy to propagate. In cultivation, *Acianthera leptotifolia* tends to bloom from winter to spring.



Figure 4.7 (above) The leaves and flowers of *Acianthera leptotifolia* growing mounted (Grower: Brad Cotten).

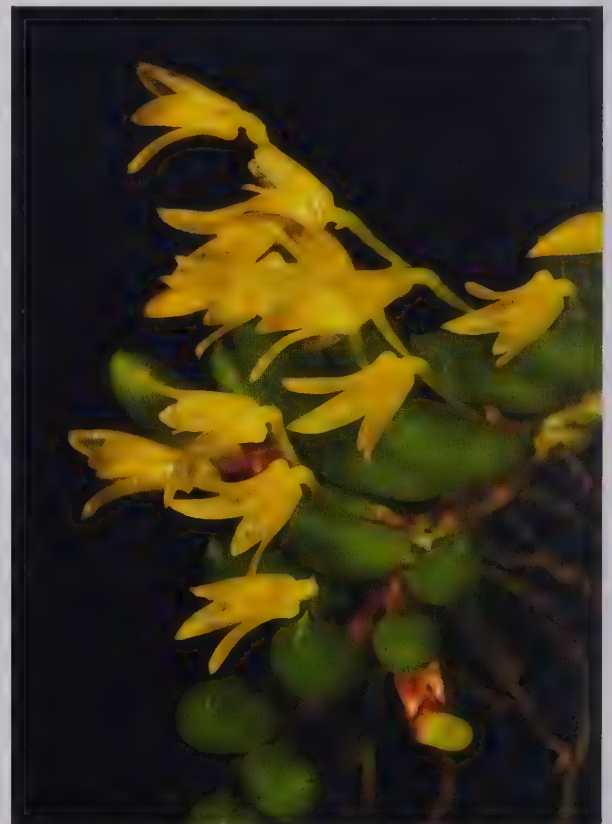


Figure 4.8 (above) The flowers of *Acianthera leptotifolia* (Grower: White Oak Orchids).

ACIANTHERA

Acianthera melanochthoda (Luer & Hirtz) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 244 (2001)

Etymology: From the Greek *melanochthodos* (with black warts) referring to the characteristic protrusions which cover the leaves.

Homotypic synonyms: *Pleurothallis melanochthoda* Luer & Hirtz, *Apoda-prorrepentia melanochthoda* (Luer & Hirtz) Luer

Morphology: Plant less than 2.5 cm tall, prostrate, creeping, mat forming, frequently branching, leaf horizontal to slightly ascending. *Ramicaul* to 0.5 cm long, stout, enclosed in sheaths, growths spaced 1–1.5 cm apart. *Leaf* 2.5–4 cm long by 1.2–2 cm wide, sessile, elliptical, slightly longitudinally folded with an obtuse apex, parallel to substrate, thick, stiff, leathery, covered with blackish-green pustule-like bumps. *Inflorescence* a raceme, extremely abbreviated, with flower usually resting on the leaf. *Flower* to 0.5 cm long, one, rarely two in number, simultaneous, resupinate, barely opening, much of the flower enclosed in a disproportionately large spathe-like bract.

Range, elevation and habitat: A species endemic to the Morona-Santiago and Zamora-Chinchipe provinces of Ecuador, at elevations of 1050–1800 m, where it grows epiphytically in wet forest and primary forest.

Culture recommendations: *Substrate* mount on cork bark or tree fern with moss. Best mounted on horizontal mounts, which have better moisture retention. Not suited to potted culture due to the creeping plant habit. *Temperature* intermediate, but may grow cooler. *Light* bright diffused to light shade. *Watering* keep moist, well-drained, but not wet. Plants may be allowed to dry out for brief periods without harm. *Humidity* high *Air movement* good.

Comments: This delightful, mat forming species has prostrate leaves with unusual, raised blackish bumps. The flowers are thought by some to be insignificant, barely peeking out from a large spathe, but they are interesting upon close inspection. However, *Acianthera melanochthoda* is worth growing just for the plant itself. The very similar species *Pleurothallis dodsonii* (not formally placed in *Acianthera*) is very similar in both plant and flower, but its leaves, whilst generally spotted, lack the bumps. *Acianthera melanochthoda* tends to bloom during autumn to mid-winter in cultivation.

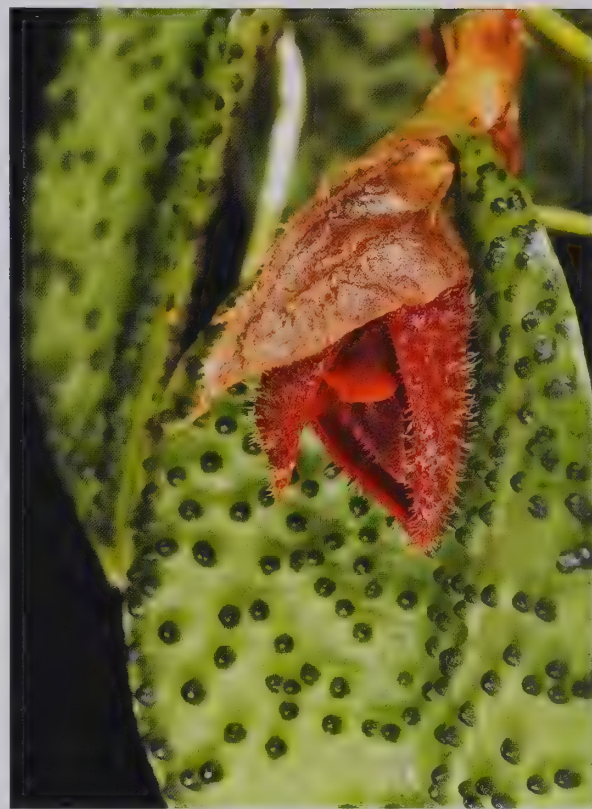


Figure 4.9 (above) The unusual leaf and flower of *Acianthera melanochthoda* (Grower: Mary Gerritsen).

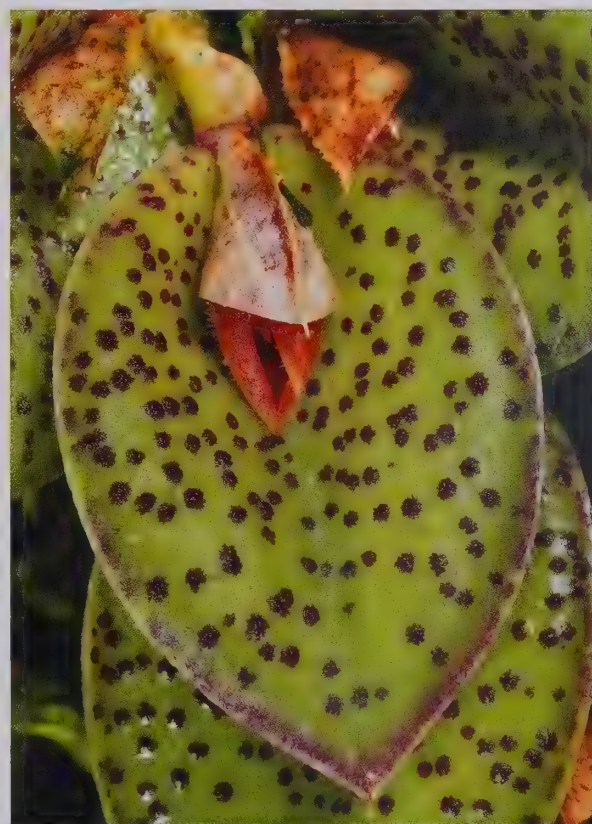


Figure 4.10 (above) The leaf of the similar *Pleurothallis dodsonii* lacks raised, pustule-like bumps (Grower: Russ Varnado).

ACIANTHERA

Acianthera recurva (Lindl.) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 246 (2001)

Etymology: From the Latin *recurvatus* (arching, or curved backwards), referring to the barely noticeable arching of the leaf.

Homotypic synonyms: *Pleurothallis recurva* Lindl., *Humboltia recurva* (Lindl.) Kuntze, *Specklinia recurva* (Lindl.) F.Barros.

Heterotypic synonyms: *Acianthera punctata* Scheidw., *Pleurothallis acianthera* Lindl., *Pleurothallis lilacina* Barb.Rodr., *Pleurothallis bistuberculata* Barb.Rodr., *Pleurothallis lilacina* var. *albipetala* Barb.Rodr., *Pleurothallis lilacina* var. *microphylla* Barb.Rodr., *Pleurothallis regeliana* Rchb.f., *Humboltia acianthera* (Lindl.) Kuntze, *Pleurothallis maculata* Rolfe, *Pleurothallis lamproglossa* Schltr., *Pleurothallis albipetala* (Barb.Rodr.) Hoehne & Schltr., *Pleurothallis curitybensis* Kraenzl., *Pleurothallis leucorhoda* Schltr., *Pleurothallis recurva* var. *microphylla* (Barb.Rodr.) Garay.

Morphology: Plant semi-prostrate, creeping, horizontal to pendulous, branching, mat forming. *Ramicaul* to 1 cm, stout, enclosed in sheaths, leaves distichous. *Leaf* 2.5–7 cm long by 1.5–3 cm wide, sessile, obovate to oblong with an obtuse apex, lamina arcuate, slightly folded, horizontal to ascending, thick, leathery, succulent, slightly rugose, sometimes with purplish pigment. *Inflorescence* a raceme, to 5 cm long, shorter than the leaf, lax, prostrate to pendant, often lying along mid-vein of the leaf, 1–2 simultaneous inflorescences, flowers distichous. *Flower* 0.7–0.9 cm long, to 11 in number (rarely more), simultaneous, resupinate, barely spreading.

Range, elevation and habitat: *Acianthera recurva* is a fairly widespread species, although it does not typically occur in large populations. It is found in Ecuador, Bolivia (department of Santa Cruz), Brazil (states of Minas Gerais, Espírito Santo, São Paulo, Rio de Janeiro, Paraná, Santa Catarina and Rio Grande do Sul), Paraguay and Argentina (province of Misiones) at elevations of 600–1400 m. This species is found in various habitats including primary cloud forest and moist montane forest, where it grows on the branches of older trees, exposed to sun and wind, often low on trees and without much moss cover. In nature it blooms in the summer.

Culture recommendations: *Substrate* mounted, horizontally or vertically on cork bark, rough-barked hardwood or tree fern with moss. Not suited to pot culture. *Temperature* intermediate to cool. *Light* bright diffused to light shade. *Watering* moist, but not wet. Plants can be allowed to dry out slightly. *Humidity* high. *Air movement* good.

Comments: A desirable plant for the miniature collector, this species has oblong, thick, leathery, dark green leaves that are offset by the attractive spike of reddish and white flowers. *Acianthera recurva* is relatively common in cultivation, and should be easy to come by. This species tends to bloom in late summer in cultivation.



Figure 4.11 (above) The delicate flowers of *Acianthera recurva* (Grower: Lilian Severin).



Figure 4.12 (above) *Acianthera recurva* (Grower: MarniTurkel).
Figure 4.13 (facing page) *Acianthera recurva* blooms in detail (Grower: Tom Mudge).



ACIANTHERA

Acianthera sonderiana (Rchb.f.) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 246 (2001)

Etymology: In honour of the German botanist and pharmacist, Otto Wilhelm Sonder (1812–1881).

Homotypic synonyms: *Pleurothallis sonderiana* Rchb.f., *Humboltia sonderiana* (Rchb.f.) Kuntze, *Specklinia sonderiana* (Rchb.f.) F.Barros, *Acianthera sonderana* (Rchb.f.) Pridgeon & M.W.Chase.

Heterotypic synonyms: *Pleurothallis sonderiana* var. *longicaulis*

Morphology: Plant 2–6 cm tall, clumping, branching. *Ramical* to 0.5 cm, ascending to erect. *Leaf* to 2.5 cm long by 0.3 cm wide, conduplicate, narrowly lanceolate, apex obtuse to acute, lamina sulcate, thick, leathery, yellowish green, sessile, erect to suberect. *Inflorescence* a raceme, 3–5 cm, slender, terete, glabrous. *Flower* 0.5–0.7 cm long, 3–5 in number, simultaneous, resupinate, tubular, barely spreading.

Range, elevation and habitat: *Acianthera sonderiana* is widespread and common, found in many states in southern Brazil (Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul), as well as northern Argentina (province of Misiones), at elevations of 600–800 m. This epiphytic species is found in several habitats, including open, primary cloud forest on the upper branches exposed to sun and wind, as well as cool, moist, montane forest, on trunks and large lateral branches with mosses and lichens. This species is quite commonly found in *Araucaria* forests. It blooms from summer to winter in nature.

Culture recommendations: *Substrate* mount on cork or tree fern with moss, or pot in New Zealand *Sphagnum* moss, fine bark or fine bark mix. *Temperature* warm-intermediate to intermediate. *Light* bright diffuse to light shade. *Watering* keep moist not wet, well-drained or soggy. *Humidity* high. *Air movement* good.

Comments: *Acianthera sonderiana* can have a mass blooming of bright yellow to orange-yellow flowers, an attractive sight on a specimen-sized plant. This species is easy to grow under the proper conditions, is readily available and relatively inexpensive. It blooms from summer to winter in cultivation, and is an excellent choice for growers who wish to try their hand with pleurothallids.

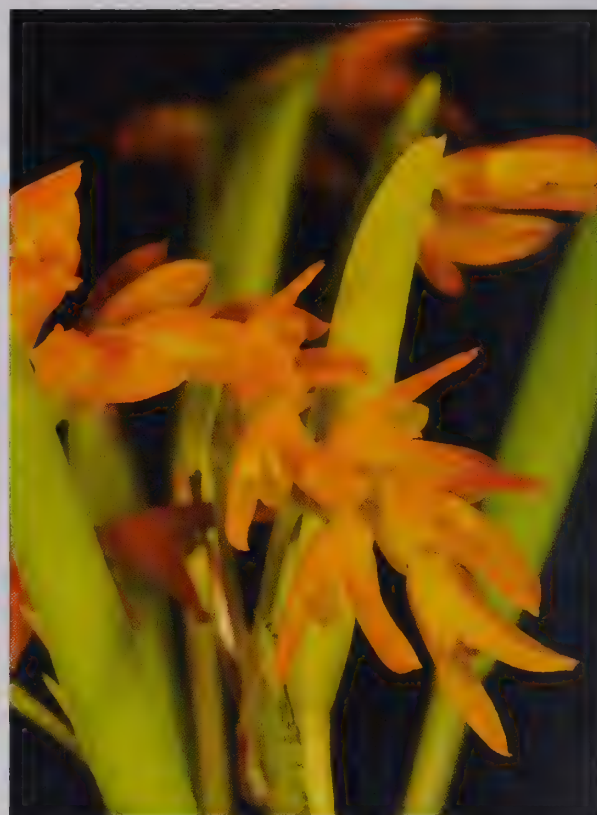


Figure 4.14 (above) The flowers of *Acianthera sonderiana* in cultivation (Grower: Mary Gerritsen).



Figure 4.15 (above) *Acianthera sonderiana*, growing in the municipality of Ribeirão Grande, state of São Paulo, Brazil (Photo: Leonardo Desordi Lobo).



Figure 4.16 (above) *Acianthera sonderiana* habitat in the municipality of Ribeirão Grande, São Paulo, Brazil, growing on a tree trunk with commensal epiphytes (Photo: Leonardo Desordi Lobo).

Figure 4.17 (below) Epiphytic *Acianthera sonderiana* growing in Brazil with *Microgramma* ferns, probably *M. squamulosa* (Photo: Leonardo Desordi Lobo).

ACIANTHERA

Acianthera teres (Lindl.) Borba, Sitientibus, Ciênc.

Publication: *Biol.* 3: 23 (2003)

Etymology: from the Latin *teres* (quill-like, cylindrical) referring to the narrow form of the leaf.

Homotypic synonyms: *Pleurothallis teres* Lindl., *Humboltia teres* (Lindl.) Kuntze.

Heterotypic synonyms: *Pleurothallis rupestris* Lindl., *Pleurothallis pachyphylla* Rchb.f., *Humboltia pachyphylla* (Rchb.f.) Kuntze, *Humboltia rupestris* (Lindl.) Kuntze, *Acianthera rupestris* (Lindl.) F.Barros.

Morphology: Plant to 11 cm tall, mat forming, often producing huge colonies, frequently branching, growths closely set, erect. *Ramicaul* extremely short, cylindrical, enclosed in sheaths. *Leaf* 3–11 cm long and up to 1 cm wide, sessile, terete (except for dorsal channel), linear to curved, apex acute, apiculate, reddish brown in colour. Leaves may be elongate and finger-like to short and stout, depending on exposure. *Inflorescence* a raceme, 5–10 cm long, ascending to erect, slender, secund. *Flower* 0.5–0.7 cm, to 12 or more in number, nodding, not spreading widely, on short pedicels, orangey to reddish.

Range, elevation and habitat: A locally abundant species from southern Brazil (states of Bahia, Minas Gerais, Espírito Santo, and Rio de Janeiro) at 500–1150 m elevation, *Acianthera teres* is found in hot, dry, inland areas on rock outcrops, in moist, humus-filled cracks and on relatively flat ledges. It is mat forming and can cover large expanses, and plants are exposed to bright light, with hot summers and cold, dry winters with nightly dew. This species often grows with rupicolous *Laelia* (*Cattleya*).

Culture recommendations: *Substrate* mount on cork bark with little New Zealand *Sphagnum* moss or pot in a well-drained mix of fine bark and rock (granite chips, pumice, diatomite). *Temperature* warm to hot days, cool nights. *Light* bright. *Watering* in summer, this species benefits from plentiful water, but should be well-drained. In winter, plants should be kept nearly dry with occasional misting or very light watering. *Humidity* average 50%, generally less during the day and higher at night. *Air movement* good to strong.

Comments: *Acianthera teres* is a most unusual plant for the genus, with its erect, succulent leaves and rock-loving habit, characteristics uncommon amongst pleurothallids. In nature it can form colonies so large that it is difficult to avoid stepping on plants. In cultivation it blooms in late spring and autumn. It is not commonly seen in collections, but should be sought out as it makes a great companion plant to grow with any collection of rupicolous *Laelia* (*Cattleya*).

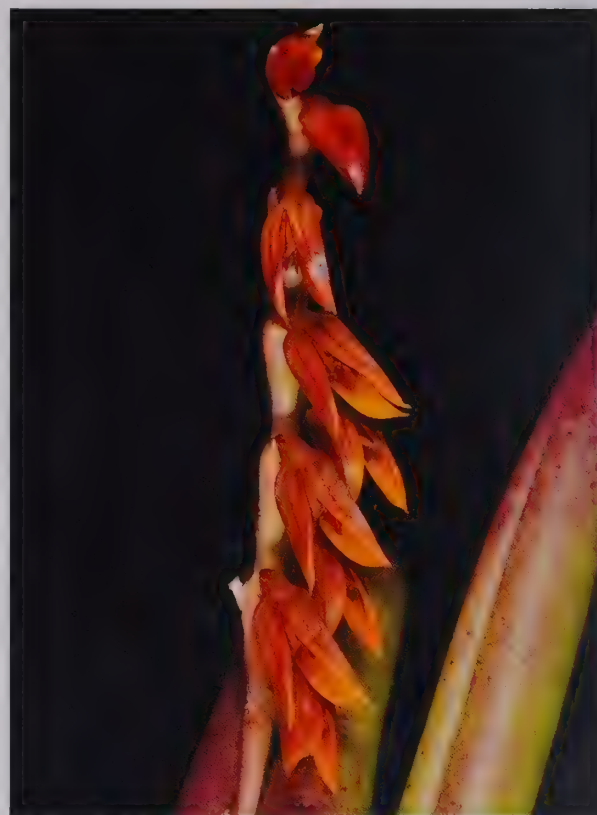


Figure 4.18 (above) The inflorescence and flowers of *Acianthera teres* (Grower: Mary Gerritsen).



Figure 4.19 (above) A clump of *Acianthera teres* in Serra do Cara, Minas Gerais, Brazil (Photo: Leonardo Desordi Lobo).



Figure 4.20 (above) Colonies of *Acianthera teres* growing in full sun in a transitional area between Cerrado and Atlantic forest, elevation 1500 m, Serra do Cara, Minas Gerais, Brazil. This species commonly grows with *Cattleya longipes* and *C. fournieri* (Photo: Leonardo Desordi Lobo).

Figure 4.21 (below) *Acianthera teres* plants growing lithophytically amongst scant humus and leaf litter (Photo: Ron Kaufmann).

Aerangis Rchb.f.

Publication: Reichenbach, H. G., 1865, *Flora* 48: 190

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Aerangidinae

Type species: *Aerangis flabellifolia* Rchb.f. (now correctly known as *Aerangis brachycarpa* (A.Rich.) Durand & Schinz), 1894, *Consp. Fl. Afric.* 5: 50.

Etymology: From the Greek, *aer* (air) and *angos* (vessel) referring to the long spur of the lip.

Homotypic synonyms: *Radinocion* Ridl., *Barombia* Schltr., \times *Barangis* auct.

Profile: A genus of 55–60 epiphytic, or rarely lithophytic, species from Madagascar, Tropical Africa, the Comoros Islands and Réunion, with one outlying species known from Sri Lanka.

General plant morphology: Monopodial, small to medium sized, stems short to long, and sometimes woody, with distichous leaves. *Leaf* often oblanceolate, linear to strap shaped, apex bilobate, often thick and fleshy. *Inflorescence* short to long, unbranched, axillary or from stem under the leaves. *Flower* single to many, tiny to large, waxy, resupinate, sepals and petals free, subsimilar, spreading, campanulate to reflexed, lip entire, spur with nectary, flower colour white, cream coloured or yellow, sometimes with orange highlights, pollinia 2, often nocturnally fragrant.

General culture notes: Plants should be mounted and kept moist during the growing season, drying slightly between waterings. A rest period may be observed during the winter. Fertilise weekly at one-quarter strength, but reducing the frequency of fertilisation to twice a month in the winter. Plants of this genus are very sensitive to cold water, which may result in leaf spotting. The sugary exudates on the inflorescences of this genus may attract ants or lead to the development of sooty mold on the inflorescence.



Figure 4.22 (above) The fine blooms of *Aerangis fastuosa* emerge from amongst fleshy-looking rugose leaves (Grower: Cindy Hill).

AERANGIS

Aerangis fastuosa (Rchb.f.) Schltr.

Publication: *Orchideen* 598 (1914)

Etymology: From the Latin *fastuosa* (proud, magnificent) referring to the proportionately large flower.

Homotypic synonyms: *Angraecum fastuosum* Rchb.f., *Angorchis fastuosa* (Rchb.f.) Kuntze, *Rhaphidorhynchus fastuosus* (Rchb.f.) Finet.

Morphology: *Plant* 4–15 cm wide by 4–6 cm tall, stem to 6 cm, leaves 2–10 in number. *Leaf* to 7.5 cm long and 3 cm wide, ovate, obovate or elliptic, bilobate at apex, leathery, finely rugose on upper surface, glaucous, grey green, mid-vein prominently depressed. *Inflorescence* a raceme, 2–6 cm long, axillary. *Flower* to 5.5 cm, proportionately large for the plant, 2–7 in number, simultaneous, resupinate, slightly campanulate, spreading, spur 6–9 cm long. Flowers vary in width of segments and degree of openness.

Range, elevation and habitat: *Aerangis fastuosa* is found in the eastern and central Madagascar highlands (provinces of Antananarivo, Fianarantosa, Toamasina and Toliara) at elevations of 900–1750 m. It occurs in a number of habitats, including humid evergreen forest, seasonally dry montane forest, sclerophyllous forest, and coastal forest. It is epiphytic on twigs and small branches. In nature, it blooms in July to December. Conservation status unknown, but it is likely threatened due to habitat destruction.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, using New Zealand *Sphagnum* moss, or pot in a moisture retentive mix. *Temperature* intermediate. *Light* light shade. *Watering* moist, not wet, allowing plants to dry out only slightly between waterings. A somewhat drier winter is recommended. *Humidity* high. *Air movement* good. *Propagation* by seed, rarely by division.

Comments: This gem has been present in collections for a long time, and is indispensable to any collector of miniatures. This desirable species has many fine characteristics, including its numerous, attractive, greyish green, rugose leaves, proportionately huge, snowy white flowers, an enticing nocturnal fragrance, and blooms that may last for three weeks or more. Moreover, the plants start to bloom when comparatively young. Although this species is not especially variable in form, Perrier de la Bâthie attempted to name seven varieties of this species in 1941. *Aerangis fastuosa* blooms in the spring in cultivation, and does very well grown under lights. It is a must-have species in any miniature orchid collection.



Figure 4.23 (above) The *Aerangis fastuosa* plant (Grower: Napa Valley Orchids).

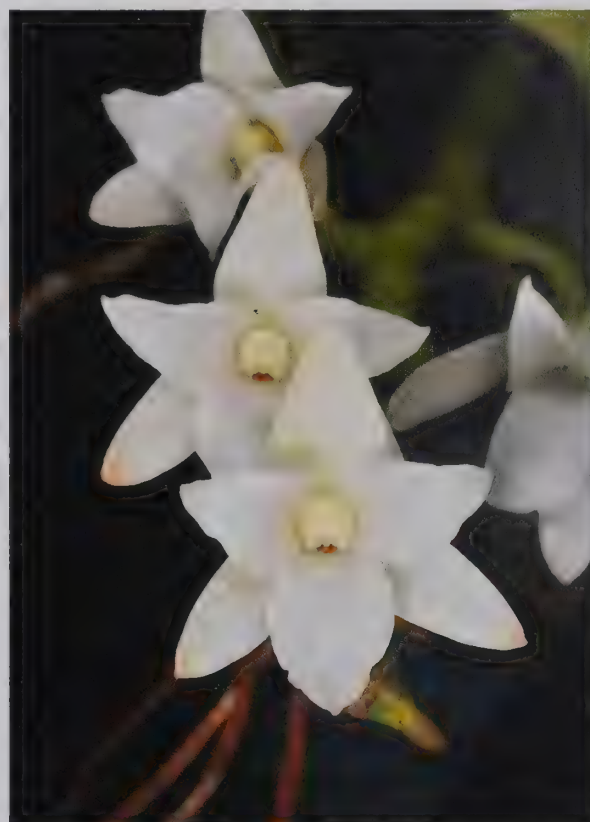


Figure 4.24 (above) Flowers of a possible natural hybrid with *Aerangis fastuosa* as one parent (Grower: Judy Carney).

AERANGIS

Aerangis fuscata (Rchb.f.) Schltr.

Publication: *Orchideen* 598 (1914)

Etymology: From the Latin *fuscata* (somewhat dusky brown) referring to the colour of the sepals and petals.

Homotypic synonyms: *Angraecum fuscatum* Rchb.f., *Angorchis fuscata* (Rchb.f.) Kuntze.

Heterotypic synonyms: *Rhaphidorhynchus umbonatus* Finet, *Aerangis umbonata* (Finet) Schltr.

Morphology: *Plant* 6–15 cm wide, stem 0.5–6 cm long, leaves 1–7 in number. *Leaf* to 9 cm long by 3 cm wide, cuneate at base, obovate to elliptic, apex unequally and bluntly bilobate, lamina thin, dull grey-green to dark green. *Inflorescence* a raceme, 7–10 cm long, descending to pendent, axillary. *Flower* 3–5 cm in diameter, 1–5 in number, simultaneous, resupinate, slightly campanulate, lip white, other segments pinkish or greenish or yellow green to pale orangey, spur 9–13 cm long.

Range, elevation and habitat: *Aerangis fuscata* is found in northeast and eastern Madagascar (provinces of Antsiranana and Toliara) at elevations ranging from sea level to 1500 m. It grows as an epiphyte on twigs and the branches of shrubs and trees in a range of habitats, though generally in humid, moist forest. Blooms in October to November (generally spring in the southern hemisphere) in nature. Conservation status unknown, but it is likely threatened due to habitat destruction.

Culture recommendations: *Substrate* best mounted on cork or hardwood with a little New Zealand *Sphagnum* moss, possibly potted in an open medium. *Temperature* warm to intermediate. *Light* light shade to shaded. *Watering* moist, not wet, allowing plants to dry slightly between waterings. Water must be substantially reduced in the winter, being careful not to overwater, but sufficient moisture must be given to keep plants from desiccating. *Humidity* high. *Air movement* medium to good. *Propagation* seed, rarely by division.

Comments: *Aerangis fuscata* is an uncommon species in collections, and many plants are still labelled as *A. umbonata*, a synonym. This species is confused with *A. monantha* on occasion, but the latter is easily distinguished by its longer stipe, which extends past the aperture of the spur. In contrast, the distinctly shorter stipe of *A. fuscata* terminates at the midpoint of the aperture. The proportionately large and exquisite flowers, with their lovely nocturnal fragrance, should ensure a place for *Aerangis fuscata* in any collection of miniatures. In cultivation, this species blooms in the spring.



Figure 4.25 (above) *Aerangis fuscata*, an uncommonly beautiful native of Madagascar (Grower: Cindy Hill).



Figure 4.26 (above) A fine bloom of *Aerangis fuscata* (Grower: Marni Turkel).

Figure 4.27 (facing page) Two exceptional, pale blooms of *Aerangis fuscata* (Grower: White Oak Orchids).





Figure 4.28 (above) A slightly greener colour variant of *Aerangis fuscata* (Grower: Cindy Hill).

Figure 4.29 (below) An *Aerangis hyaloides* plant growing mounted, bearing dozens of fine, hyaline flowers (Grower: Adam Anderson).

AERANGIS

Aerangis hyaloides (Rchb.f.) Schltr.

Publication: *Orchideen* 599 (1914)

Etymology: From the Greek *hyalos* (appearance of glass), *-oides* (like) referring to the glistening, thin-textured flowers.

Homotypic synonyms: *Angraecum hyaloides* Rchb.f., *Angorchis hyalodes* (Rchb.f.) Kuntze.

Heterotypic synonyms: *Aerangis pumilio* Schltr.

Morphology: *Plant* 4–12 (rarely to 14) cm wide, to 5 (rarely to 8) cm tall, often branched at base to form clumps, leaves 2–10 in number, occasionally more in cultivation. *Leaf* 2–7 cm long by 0.7–2.2 cm wide, oblong to oblanceolate, elliptic, ligulate or spatulate, unequally bilobate at apex, lamina thinly leathery, glossy. *Inflorescence* a dense raceme, 2–7 cm long, flowers distichous, straight or curved, axillary. *Flower* to 1 cm in diameter, to twenty in number, simultaneous, resupinate, not spreading widely, campanulate, crystalline sepals, clavate, spur 0.5–1.2 cm long.

Range, elevation and habitat: *Aerangis hyaloides* occurs in eastern Madagascar (provinces of Antsiranana and Toamasina) in coastal areas and adjacent highlands where it grows as an epiphyte in shady, moist, evergreen forest amongst lichens and mosses on the branches of small trees. It occurs at elevations from sea level to 1100 m. Blooms October–November (generally spring in the southern hemisphere) in nature. Conservation status unknown, but it is likely threatened due to habitat destruction.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood using moss, or pot in a moisture retentive medium such as New Zealand *Sphagnum* moss or fine bark mix. *Temperature* intermediate. *Light* light shade to medium shade. *Watering* Keep moist and well-drained, not wet, year round. If grown in an area with long, overcast winters, it is probably best to reduce the water to prevent leaf spotting and rot. *Humidity* high. *Air movement* good. *Propagation* seed, occasionally by division.

Comments: A wonderful miniature species with shiny, dark green leaves and many simultaneous inflorescences bearing numerous, snowy white, glistening flowers, creating a virtual “floral flurry”. This can be one of the most floriferous species in the genus. There is a natural hybrid with *A. citrata* called *Aerangis* × *primulina*. In cultivation, *Aerangis hyaloides* tends to bloom from mid-winter to early spring. For many years this species was sold as *Aerangis pumilio*, and it is still often incorrectly labelled as such in collections. This species grows well under lights.

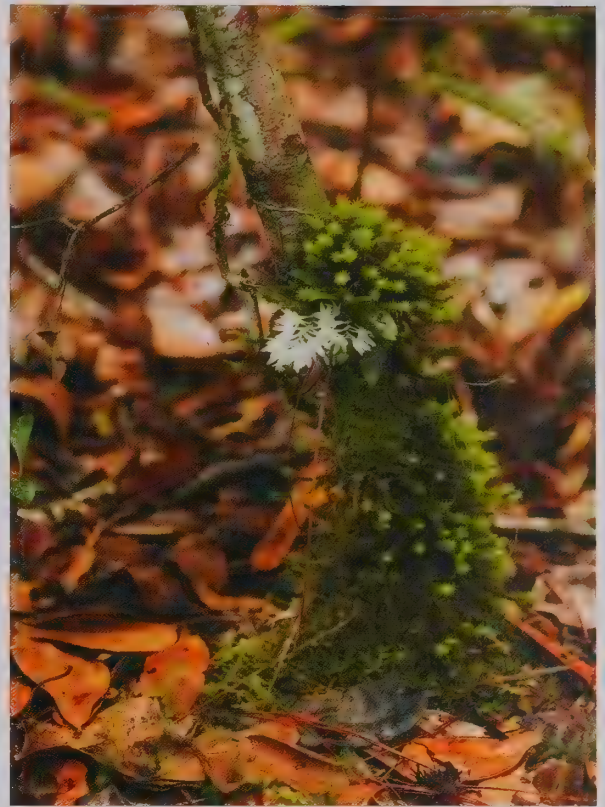


Figure 4.30 (above) *Aerangis hyaloides* growing epiphytically in Madagascar (Photo: Johan Hermans).



Figure 4.31 (above) The flowers of *Aerangis hyaloides*, seen here in cultivation (Grower: Napa Valley Orchids).

AERANGIS

Aerangis monantha Schltr.

Publication: *Repert. Spec. Nov. Regni Veg. Beih.* 33: 386 (1925)

Etymology: From the Greek, *mono* (one) and *antha* (flower) in reference to the single flower.

Morphology: *Plant* 5–6 (occasionally to 8) cm wide, stem strongly abbreviated, erect, leaves 2–5 in number. *Leaf* 3–6 cm long, 2 cm wide, attenuate at base, oblong to elliptic, apex rounded and bilobate, lamina leathery, glossy bronzy green when young, matte when mature, margins usually reddish brown. *Inflorescence* a raceme, very short, axillary. *Flower* 3.5–5 cm in diameter, 1 to rarely 2 or 3 in number, simultaneous, resupinate, sepals and petals pale-pinkish to vaguely brownish, spur to 13 cm long, curved, coiling once.

Range, elevation and habitat: *Aerangis monantha* grows in eastern and highland Madagascar (province of Antananarivo) at elevations of 800–1500 m. It is epiphytic on twigs and branches of shrubs and trees in a range of habitats that include humid forest. Records indicate that flowering occurs in October and March in nature. Conservation status unknown, but it is likely threatened due to habitat destruction.

Culture recommendations: *Substrate* mount on cork bark or hard wood, with a moderate amount of New Zealand *Sphagnum* moss. Not recommended for pot culture. *Temperature* intermediate, but cooler in the winter (to 13 °C, 55 °F). *Light* bright to medium shade. *Watering* moist, not wet. The roots should dry slightly between waterings. Plants need substantially less water in the winter, drying completely between waterings. Plants may need to have their roots misted once a week during winter rest. *Humidity* high. *Air movement* medium to good.

Comments: For several years *Aerangis monantha* was incorrectly sold as the large form of *A. curnowiana*, but that name is correctly applied to an *Angraecum* species. This species has always been uncommon in collections and is not readily available, but it is certainly worth seeking. It is much like a slightly larger form of *A. punctata*, but the leaves have a reddish margin and lack the fine stippling. The flowers of *A. monantha* are also similar to those of *A. punctata*, though fewer in number. *Aerangis monantha* has one or occasionally two flowers, whereas *A. punctata* can have up to four. This is a handsome plant with tightly overlapping, attractive leaves. In cultivation, *A. monantha* blooms in the spring.



Figure 4.32 (above) *Aerangis monantha* flower detail (Grower: Brad Cotten).



Figure 4.33 (above) Although the specific name of *Aerangis monantha* denotes “one flower”, this specimen bears two (Grower: Judy Carney).

AERANGIS

Aerangis pallidiflora H.Perrier

Publication: *Notul. Syst. (Paris)* 7: 36 (1938)

Etymology: From the Latin *pallidus* (greenish, somewhat pale) and *flora* (flower) referring to the colour of the flowers.

Morphology: *Plant* 6–14 cm wide, nearly stemless (occasionally to 3 cm), leaves 2–6 in number. *Leaf* 3–7.2 cm long by 1–2 cm wide, conduplicate at base, appearing petiolate, elliptical to broadly elliptical, apex minutely bilobate, lamina spreading. *Inflorescence* a raceme, to 25 cm long (2–3 times as long as the leaves), 1–3 simultaneous inflorescences, pendent, arising below existing leaves, or axillary. *Flower* 1.5–3 cm wide, 5–9 in number, spreading widely, segments narrow, curved spur 2.1–2.3 cm long. Flowers vary in size and lip shape.

Range, elevation and habitat: *Aerangis pallidiflora* is found in eastern and central Madagascar (provinces of Antananarivo, Fianarantsoa, and Toamasina) at elevations of 0–1500 m. It grows epiphytically on mossy twigs and branches in humid coastal and plateau evergreen forest. This species generally blooms in the summer in nature, but it has been recorded as flowering in August (late winter in Madagascar). Conservation status unknown, but it is likely threatened due to habitat destruction.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, using a small pad of New Zealand *Sphagnum* moss. Not well suited to pot culture. *Temperature* warm to intermediate. *Light* shady. *Watering* moist, not wet, allowing the roots to dry briefly between waterings, and reducing frequency in winter, especially during overcast weather. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division.

Comments: The narrow segments of the flowers of this uncommonly cultivated species give it a star-like appearance. *Aerangis pallidiflora* is somewhat similar to *A. seegeri*, but the latter species has a differently shaped and shorter spur, as well as shorter and broader leaves. In cultivation, *Aerangis pallidiflora* blooms in the summer.



Figure 4.34 (above) The blooms of *Aerangis pallidiflora* in cultivation (Grower: Judy Carney).

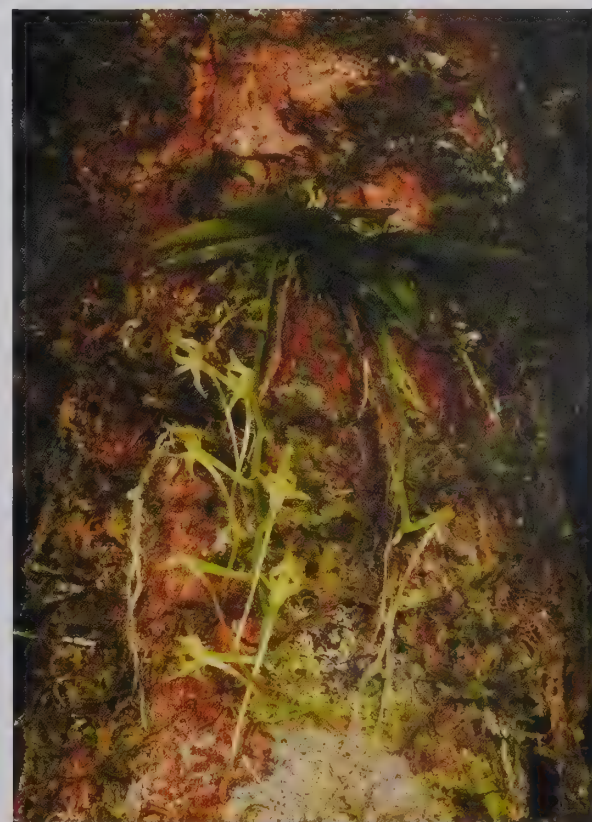


Figure 4.35 (above) *Aerangis pallidiflora* growing epiphytically in Madagascar (Photo: Jean-Michael Hervouet).

AERANGIS

Aerangis punctata J. Stewart

Publication: *Amer. Orchid Soc. Bull.* 55: 1120 (1986)

Etymology: From the Latin *punctatus*, having a pockmarked surface, referring to the spot-like indentations on the leaves

Morphology: *Plant* 4–7 cm wide, stem, 1–2 cm, leaves 2–4 in number, roots verrucose, flattened, greyish, warty, growing tips copper coloured. *Leaf* 2–3.5 cm long by 0.6–1.2 cm wide, oblong-elliptic with a bilobate apex, lamina dull, greyish-green, spotted with silvery dots. *Inflorescence* a raceme, 1–2 cm long, borne from stem below leaves. *Flower* 2.5–4 cm wide, 1–4 in number, but rarely more than 3, spur 10–13 cm long and often coiled, slender pedicellate ovary 2.5–3.5 cm long.

Range, elevation and habitat: *Aerangis punctata* has been found in central highland Madagascar (province of Antananarivo) and the island nation of Réunion at elevations of 900–1500 m. It grows as an epiphyte on shrubs and trees in humid evergreen forest on plateaus, as well as highland forest and scrub. It blooms in summer (December to March) in nature.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood. This species is not well suited to tree fern or pot culture. *Temperature* warm to intermediate with a much cooler rest in the winter (to 10 °C, 50 °F). *Light* light shade to medium shade. *Watering* moist, not wet, and well-drained, allowing plants to dry out slightly between misting and watering. Winter rest somewhat dry, misting roots occasionally to avoid desiccation. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division.

Comments: One of the finest species in the genus, if not of all miniature orchids. The plants are very charming, with broad, minutely spotted, grey green leaves. The stunning, surprisingly large, white flowers, often with brown tinged segments, are beautifully shaped, with a proportionately long nectary. The spur forms a perfect circle in bud and sometimes while opening, but generally unravels as the flower ages, maturing to an elongate S-shape. A minor drawback of this species is its short-lived blooms. This species was sold as *Aerangis curnowiana* for many years. It flowers from mid-summer to autumn in cultivation, becoming dormant for a period thereafter.



Figure 4.36 (above) The stunning, substantial bloom of *Aerangis punctata* (Grower: Tom Mudge).



Figure 4.37 (above) The elegant flower of *Aerangis punctata* in profile (Grower: Tom Mudge).

Alamania Lex.

Publication: de Lexarza, J. J. M., 1825, *Nov.Veg. Descr. 2 (Orch.Opusc.)* 31

Subfamily: Epidendroideae

Tribe: Epidendreae

Subtribe: Laeliinae

Type species: *Alamania punicea* Lex., 1825, *Nov.Veg. Descr. 2 (Orch.Opusc.)*: 31.

Etymology: Named for Lucas Ignacio Alamán y Escalada (1792–1853), Mexican scientist, politician, historian and writer. Alamán became one of the most influential politicians in post-revolutionary Mexico, co-founding the Mexican Conservative Party and believed to be behind the execution of Vicente Guerrero, a hero of Mexican independence. He also is credited with the creation of the Natural History Museum in Mexico City, and for founding Mexico's General National Archive. He is listed as a collector of a number of species of Mexican plants with Swiss naturalist, Augustin de Candolle (Harvard University Herbarium, Index of Botanists).

Profile: A monotypic genus, endemic to Mexico, with 2 recognised subspecies.

General plant morphology: Sympodial, epiphytic, miniature, creeping. *Inflorescences* formed on aphyllous pseudobulbs, separate growths that form after the seasonal growth of a pseudobulb is complete. Pollinia 2.



Figure 4.38 (above) A profusion of *Alamania punicea* blooms makes for a fine display (Grower: John Leathers).

ALAMANIA***Alamania punicea* Lex.****Publication:** *Nov. Vég. Descr.* 2 (*Orch. Opusc.*) 31 (1825)**Etymology:** From the Latin *puniceus* (crimson coloured) referring to the red flowers**Homotypic synonyms:** *Epidendrum puniceum* (Lex.) Rchb.f.

Morphology: *Plant* to 5 cm tall, creeping, clumping (close-set to 1 cm apart), branching, proportionately thick roots. *Pseudobulb* small, to 2.5 cm tall by 0.5 cm wide, narrowly conical to semi-cylindrical, erect to oblique, leaves apical, 1–3 in number. *Leaf* to 4.5 cm long by 1.5 cm wide, oblanceolate to elliptic-oblong, apex acute to obtuse, apiculate, lamina suberect to almost spreading, flat to arcuate, leathery, semi-flexible, often suffused with purple. *Inflorescence* a raceme, congested at apex, shorter than leaves, on separate growth (aphyllous pseudobulb). *Flower* 0.8–1.5 cm in diameter, 4–9 (occasionally more) in number, simultaneous, resupinate, often not spreading widely, campanulate. Flowers vary both in terms of colour, which ranges from orange to nearly red, and in the degree of openness, some being much more campanulate than others.

Range, elevation and habitat: *Alamania punicea* is endemic to Mexico, where it grows as an epiphyte, or rarely as a lithophyte, at elevations of 1500–3000 m. It is known from several habitats, including open woods, lava flows, oak forest, oak and pine forest, pine-oak-beech forest, and high elevation cloud forest. For brief periods at higher elevations, the plants may be exposed to snow and freezing temperatures. The nominate subspecies is very rare in nature, whereas subspecies *greenwoodiana* can be locally abundant. It blooms from April to May, at the end of the dry season.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood with a little New Zealand *Sphagnum* moss; excess moss may lead to root rot. It is not suited to pot culture. *Temperature* cool intermediate to cool, with a distinct night and day temperature difference. If grown too warm, this species is not likely to bloom. It can tolerate near freezing temperatures for short periods. *Light* bright diffused to light shade. *Watering* water frequently, but allow to dry briefly between waterings from late spring to early autumn. Plants should be kept dry from late autumn until mid spring (ca. 6 months) with only occasional misting to keep plants from severe desiccation. *Humidity* high during summer, lower during the winter. *Air movement* good. *Propagation* by division or seed. *Pests and Diseases* occasionally this species is prone to mealy bug infestations, particularly if grown too warm. *Fertilise* at 1/4 to 1/2 strength during the growing season, but withhold fertiliser during the winter dormancy

Comments: There are two recognised subspecies of *Alamania punicea*. The nominate subspecies, *Alamania punicea* ssp. *punicea* Lex., is extremely rare and grows in the states of Jalisco, México, Michoacán, Oaxaca and Sinaloa, where it grows in seasonally-dry oak forest at high altitudes near the ecotone



Figure 4.39 (above) Mass blooms of *Alamania punicea* ssp. *greenwoodiana*, seen here in cultivation (Grower: John Leathers).



Figure 4.40 (above) A pair of *Alamania punicea* ssp. *greenwoodiana* flowers (Grower: Ron Parsons).

ALAMANIA

with coniferous forest. The widespread, and locally abundant subspecies, *Alamania punicea* ssp. *greenwoodiana* Soto Arenas & R. Jiménez, grows in the states of Hidalgo, Oaxaca, Puebla, Querétaro, San Luis Potosi and Veracruz, where it occurs in moist cloud forest. *Alamania punicea* ssp. *punicea* has orange flowers, is smaller, slightly repent, and known only from a handful of specimens. *Alamania punicea* ssp. *greenwoodiana* is distinguished from the nominate subspecies by its reddish flowers, narrower segments, increased number of flowers per inflorescence, leaves that are not as succulent as those of ssp. *punicea*, and individual plants that are generally erect and spreading. However, in the more common subspecies, the growth pattern results in new pseudobulbs and roots being produced at a distance from previous ones; the net effect is that the plant appears to droop or fall away from its host. *Alamania punicea* ssp. *punicea* tends to form clumps that blanket the host tree with tightly interwoven roots and pseudobulbs; moreover, this subspecies has highly coriaceous leaves.

This is a very unusual member of the Laeliinae because the flowers arise from a separate, leafless pseudobulb, as in *Cattleya walkeriana* and *C. nobilior*. This species has no close relatives in the *Cattleya* alliance, and no hybrids have been made to date. As can be seen in the images, this species is particularly eye-catching when grown to specimen size. It blooms from early to mid spring.

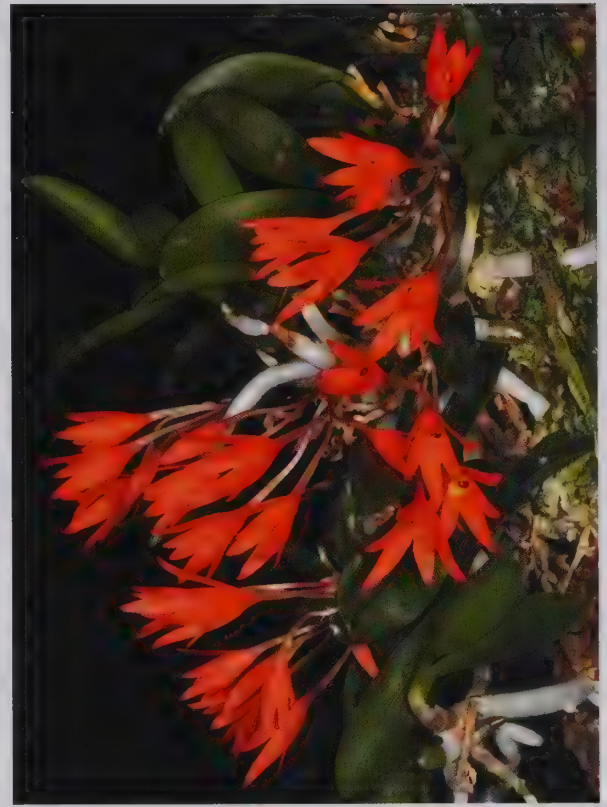


Figure 4.41 (above) Plants of *Alamania punicea* ssp. *greenwoodiana* bearing many flowers (Grower: Ron Parsons).



Figure 4.42 (above) Detail of an *Alamania punicea* ssp. *punicea* plant and flower (Photo and grower: Dennis Szeszko).

Amesiella Schltr. ex Garay

Publication: Garay, L. A., 1972, *Bot. Mus. Leafl.* 23: 159

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Aeridiinae

Type species: *Amesiella philippinensis* (Ames) Garay, 1972, *Bot. Mus. Leafl.* 23: 160.

Etymology: Named in honour of American botanist, Oaks Ames (1874–1950), a specialist in orchids. Professor Ames was the Director of the Harvard Botanic Garden, founder of the orchid herbarium (Oakes Ames) at Harvard University, and an author of many works on orchids.

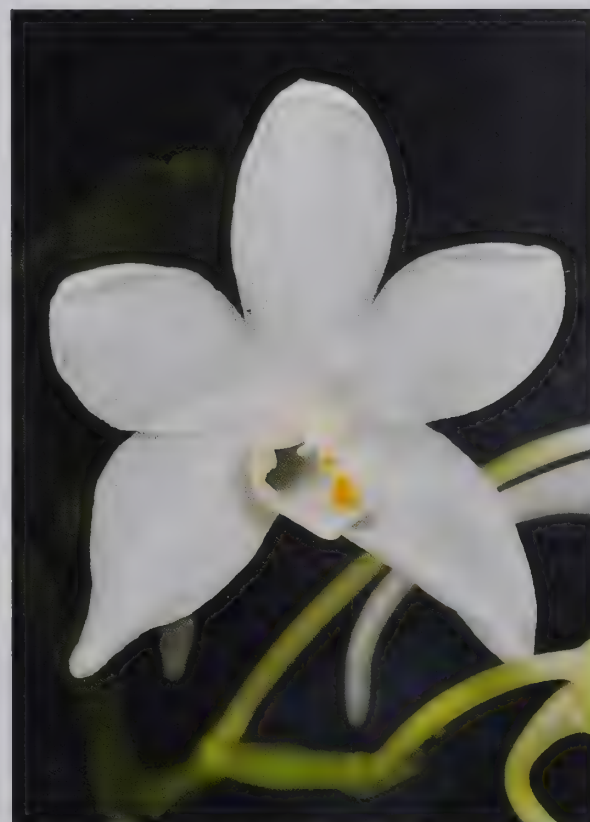
Profile: A genus of 3 species, all endemic to the Philippines.

General plant morphology: Monopodial, epiphytic, short stemmed, leaves few to several, distichous, imbricate, roots proportionately thick and fleshy. *Leaf* conduplicate, elliptic to elliptic-oblong with an unequally bilobate apex, leathery, rigid, fleshy. *Inflorescence* axillary, initiating months before blooming. *Flowers* proportionately large, white, resupinate, widely spreading, sepals and petals subsimilar, lateral sepals joined at base to column foot, lip trilobed, with long, proportionately thick, downwardly-curved spur, rostellum trilobed, pollinia 2.

General culture notes: The flowers of all species are prone to spotting from *Botrytis* if the air is too humid or there is insufficient air movement. These species have no dormancy.



Figure 4.43 (above) A plant of *Amesiella minor* bearing many fine flowers, seen here growing as a cultivated epiphyte (Grower: Brad Cotten).

AMESIELLA***Amesiella minor*** Senghas**Publication:** *J. Orchideenfr.* 6: 121 (1999)**Etymology:** From the Latin *minor* (smaller), referring to the plant size, which is the smallest of all three species in the genus.**Morphology:** *Plant* to 10 cm wide, stem to 3 cm tall, few to several leaves, long thick roots. *Leaf* to 6 cm long by 1.8 cm wide, conduplicate, narrowly-oblong to elliptic with an obtuse, sometimes slightly falcate apex, lamina thick, leathery, fleshy, paler underneath. *Inflorescence* a raceme, to 7 cm long, 1–3 simultaneous inflorescences, horizontal to pendent, thick, axillary. *Flower* to 2.5–3 cm tall, to 5 in number, simultaneous, spur to 5 cm long. Flowers vary in overall shape; some are much fuller than others, the width of segments may vary, and the margins may be entire to undulate.**Range, elevation and habitat:** *Amesiella minor* is endemic to the Philippines, where it occurs in central Luzon in the provinces of Aurora and Nueva Viscaya at elevations of approximately 1200 m. It grows on thin mats of moss where it is shallowly rooted on trunks and twigs, but less so on branches, in moist, montane forest. This species is sometimes found growing with *Ceratocentron fessellii*. In nature, the species bloom from November–January, amongst the coolest months of the year on Luzon. This localised species is endangered due to over-collection.**Culture recommendations:** *Substrate* best mounted on cork bark or rough-barked hardwood, or potted with New Zealand *Sphagnum* moss or a loose, well-drained moisture-retentive medium. *Temperature* intermediate. *Light* light shade. *Watering* moist, but well-drained, allowing the mount to dry out slightly between waterings. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 to 1/2 strength weekly year round, but reduce the amount and frequency if grown in areas with long overcast periods during the winter.**Comments:** This is the most recently described species in the genus. The segments of the flowers of *Amesiella minor* are not as full and as round as those of the other two species, but the smaller, often more numerous, crystalline flowers have a delicate charm of their own. The overall plant size is much smaller than the other *Amesiella*. Plants in cultivation tend to bloom in the autumn through winter, but may bloom at other times as well. This species does very well when grown under lights.**Figure 4.44 (above)** The crystalline flowers of *Amesiella minor* (Grower: Brad Cotten).**Figure 4.45 (above)** A single *Amesiella minor* bloom (Grower: Ron Parsons).

AMESIELLA***Amesiella philippinensis* (Ames) Garay****Publication:** *Bot. Mus. Leaf.* 23: 160 (1972)**Etymology:** The toponym *Philippines* plus the Latin suffix *-ensis* (of, from), meaning from the Philippines.**Homotypic synonym:** *Angraecum philippinense* Ames.**Morphology:** *Plant* 4–14 cm wide, 3–6 cm tall, few to several leaves, long, thick, fleshy roots. *Leaf* 2–7 cm long by 0.6–2.8 cm wide, conduplicate, elliptic-oblong, apex obtuse, lamina straight, thick, fleshy, leathery. *Inflorescence* a raceme, to 5 cm long, 1–3 simultaneous inflorescences, horizontal to ascending, thick, axillary. *Flower* 3.5–4.5 cm wide, 1–5 in number, simultaneous, yellow marking on lip, spur to 7 cm long, not fragrant. Flower segment width varies, as does the amount of yellow on the lip.**Range, elevation and habitat:** *Amesiella philippinensis* is endemic to the Philippines. It occurs on the islands of Luzon (provinces of Albay, Benguet, Mountain Province and Nueva Viscaya), Mindoro and Sibuyan, where it grows as an epiphyte in moist, montane forest at elevations of 400–1400 m. The type collection came from the forested slopes of Mt. Halcon, Mindoro, where it was collected at an elevation of 762 m. This localised species is endangered due to over-collection.**Culture recommendations:** *Substrate* mount on cork bark or rough-barked hardwood, or pot using an open, medium-sized bark mix or New Zealand *Sphagnum* moss (best in a clay pot). *Temperature* warm to intermediate. *Light* light shade. *Watering* keep moist and well-drained, not wet. In the winter, when cultivated in countries with short day lengths or prolonged overcast days, watering should be less frequent. Keep water out of crown when grown upright in a pot. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 to 1/2 strength weekly year round, but reduce the amount and frequency if grown in areas with long overcast periods during the winter.**Comments:** A highly recommended species with proportionately huge, full-shaped flowers, this popular miniature is relatively easy to obtain and well worth growing. The inflorescences begin to form months before blooming. In cultivation it blooms from late autumn through winter. The unscented flowers are relatively long lasting (2–3 weeks). When first discovered, this species was thought to be an *Angraecum*, hence the synonym *Angraecum philippinensis*. The species is similar to *Amesiella monticola*, but that species differs in having larger, pure white, nocturnally-scented flowers, a longer spur, lateral lip lobes that are straight, not rounded, larger overall plant stature, and a higher altitudinal range.**Figure 4.46 (above)** Blooms of *Amesiella philippinensis* in cultivation (Grower: Cindy Hill).**Figure 4.47 (above)** The flowers of *Amesiella philippinensis* are more rounded than those of *A. minor* (Grower: Jacob Knecht).



Figure 4.48 (above) An *Amesiella philippinensis* plant growing as an epiphyte in the Philippines (Photo: Ravan Schneider).

Figure 4.49 (below) A fine display of *Amesiella philippinensis* flowers in cultivation (Grower: Cindy Hill).

Anathallis Barb.Rodr.

Publication: Barbosa Rodrigues, J., 1877, *Gen. Spec. Orchid.* 1: 23

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Anathallis obovata* (Lindl.) Pridgeon & M.W.Chase, 2001, *Lindleyana* 16: 250.

Etymology: From the Greek *ana* (again) and *thallien* (to bloom), probably a reference to the successive production of racemes seen in many of the species.

Heterotypic synonyms: *Palmoglossum* Klotzsch ex Rchb.f., nom. inval., *Panmorphia* Luer. Members of this genus were formerly incorporated into the mega-genus *Pleurothallis* and were reinstated to genus level in 2000. Not all of the species originally proposed by Barbosa Rodrigues (1877) are placed within this genus.

Profile: Over 140 species of epiphytic, occasionally terrestrial (in leaf litter), species found in humid forest and cloud forest at elevations of 200–3000 m. Species in this genus occur from southern Mexico and south to Brazil, Bolivia and Argentina, as well as the Greater Antilles, although most species occur within the Andean territories of Colombia, Ecuador, Peru and Bolivia.

General plant morphology: Sympodial, clumping to repent. *Leaf* petiolate, coriaceous. *Inflorescence* a raceme, rarely single flowered, floral bracts tubular or infundibular and oblique, arising from the stem annulus singly or from fascicles. *Flowers* successive or simultaneous, resupinate, often with acute to laminate sepals and or petals, lateral sepals free or connate, petals proportionately large for pleurothallids, lip hinged to the column foot, column semi-terete to terete, often winged, hooded in many species, pollinia 2.

General culture notes: Water with good quality water and fertilise at half strength weekly. Keep moist. For those collections grown in areas that experience winters with short day length and low light conditions, fertilisation should be reduced to 1/4 strength, twice per month, during the winter. In common with most pleurothallids, all members of this genus are prone to bean yellow mosaic virus (BYMV). Care should be taken to prevent aphid infestations, as they are vectors for the virus. Good aseptic technique should be followed when repotting the plants or when removing or trimming leaves and flowers.

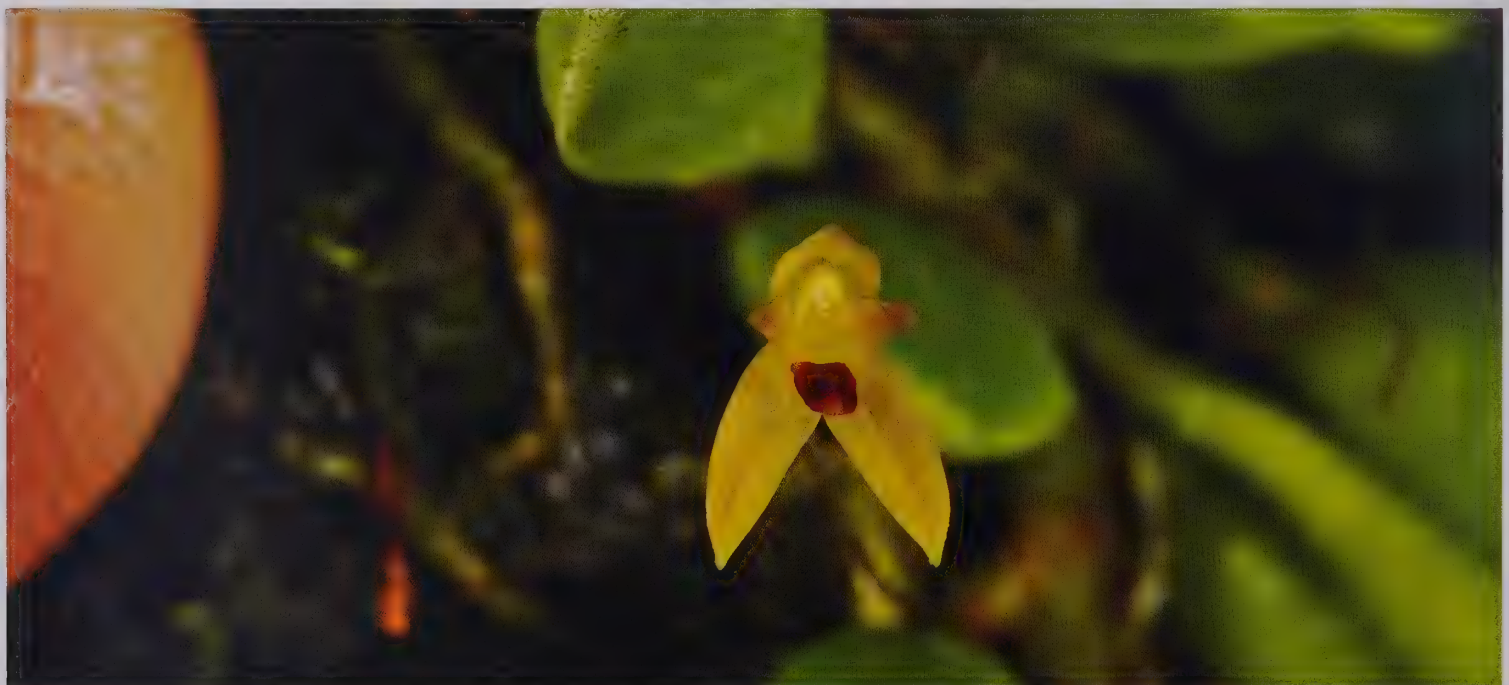


Figure 4.50 (above) The tip of an index finger dwarfs the minute, but perfectly formed flower of an *Anathallis* sp. (Grower: California orchids).

ANATHALLIS***Anathallis lewisiae* (Ames) Solano & Soto Arenas****Publication:** *Icon. Orchid.* 5–6: x (2002 publ. 2003)**Etymology:** Named in honour of Margaret Ward Lewis, who collected this species in the Department of Izabal, near Puerto Barrios, Guatemala.**Homotypic synonyms:** *Pleurothallis lewisiae* Ames, *Specklinia lewisiae* (Ames) Luer, *Panmorphia lewisiae* (Ames) Luer.**Morphology:** *Plant* 0.5–1 cm tall, branching, creeping and closely appressed to substrate, distichous. *Ramicaul* 0.1–0.2 cm long, nearly horizontal to ascending, enclosed in a sheath. *Leaf* 0.6–1.5 cm long by 0.4–0.7 cm wide, sessile, elliptical to broadly oval or nearly orbicular with an obtuse apex, lamina more or less prostrate, overlapping, thickly leathery, minutely rugose. *Inflorescence* a raceme, 1–2 simultaneous inflorescences, to 1 cm long, erect, sub-secund, peduncle 0.5–0.8 cm long, borne from near apex of ramicaul. *Flower* 0.5–0.7 cm tall, 3–6 in number, successive, resupinate, spreading widely, pedicels 0.2–0.3 cm.**Range, elevation and habitat:** A common and widespread species, *Anathallis lewisiae* is found in Mexico (states of Chiapas and Oaxaca), Guatemala, Belize (districts of Cayo, Stann Creek and Toledo), Honduras, Nicaragua (departments of Atlántico Sur, Chontales and Zelaya), Costa Rica (province of Puntarenas) and Panama. It occurs at elevations of 10–510 m in various habitats including tropical wet forest with occasional dry periods. Sites include the vertical branches of tall trees exposed to abundant light and wind, and also trees on savannahs. The flowering period of this species in nature is unknown, but it is likely that plants can bloom at any time.**Culture recommendations:** *Substrate* mount on cork bark or rough-barked hardwood with moss, possibly tree fern. Not well suited to pot culture. *Temperature* warm. *Light* bright diffused to light shade. *Watering* moist and well-drained, not soggy. Tolerates occasional, short dry periods. *Humidity* high. *Air movement* good to strong. *Propagation* division (easy) and seed.**Comments:** Although not commonly seen in cultivation, this is a perfect plant for the lover of so-called ‘micro-minis’, the smallest of miniature orchids. A truly tropical species, this is a pleurothallid that can be grown in warm-growing collections. *Anathallis lewisiae* has tiny, attractive, shingle-like roundish leaves and proportionately huge flowers. Both this species and *A. nanifolia* might well be grown for their foliage alone. This species may bloom at any time, but does so most often in the spring and summer.**Figure 4.51 (above)** *Anathallis lewisiae* leaves and flowers (Grower: Lilian Severin).**Figure 4.52 (above)** An undetermined species of *Anathallis* (Grower: Lilian Severin).

ANATHALLIS***Anathallis nanifolia* (Foldats) Luer**

Publication: *Monogr. Syst. Bot. Missouri Bot. Gard.* 115: 259 (2009)

Etymology: From the Latin *nano* (very small, dwarf) and *folius* (leaves), referring to the small leaves of this species.

Homotypic synonyms: *Pleurothallis nanifolia* Foldats, *Specklinia nanifolia* (Foldats) Luer, *Panmorphia nanifolia* (Foldats) Luer.

Morphology: Plant rhizome to 10 cm, branching, creeping, distichous, forming dense mats, to 0.2 cm between ramicauls. *Ramicaul* 0.1 cm long, suberect to nearly horizontal, stout, enclosed in sheath. *Leaf* 0.4–0.9 cm long by 0.4–0.7 cm wide, sessile, broadly oval-elliptical to orbicular with an obtuse apex, lamina more or less prostrate, overlapping, thickly leathery. *Inflorescence* a raceme, to 1 cm long, including 0.2–0.4 cm peduncle, sub-lax, sub-secund, borne from near apex of ramicaul. *Flower* 0.5–0.7 cm tall, 3–4 in number, successive, resupinate, spreading, minute pedicels. In nature, this species may bloom in any month.

Range, elevation and habitat: *Anathallis nanifolia* occurs in southern Venezuela (state of Bolivar), Ecuador (province of Morona-Santiago) and Bolivia (department of Santa Cruz) at elevations of 120–930 m. This species occurs locally and is uncommon in the Amazon basin. In Venezuela it grows in fairly open, rather scrubby forest, often on trees near rivers. It is quite possible that this species is more widespread, but overlooked on account of its small size. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood with moss, possibly tree fern. Not well suited to pot culture. *Temperature* warm to intermediate. *Light* bright diffused to light shade. *Watering* moist and well-drained, not soggy. Tolerates occasional, short dry periods. *Humidity* high. *Air movement* good to strong. *Propagation* easy by division, and also from seed.

Comments: This species forms mats, like *Anathallis lewisiae*, but it is rather uncommon in cultivation, though no less desirable. While the dark flowers are proportionately large, they are not always easily spotted when in flower due to the diminutive size of the plant. This species may bloom in any month in cultivation.

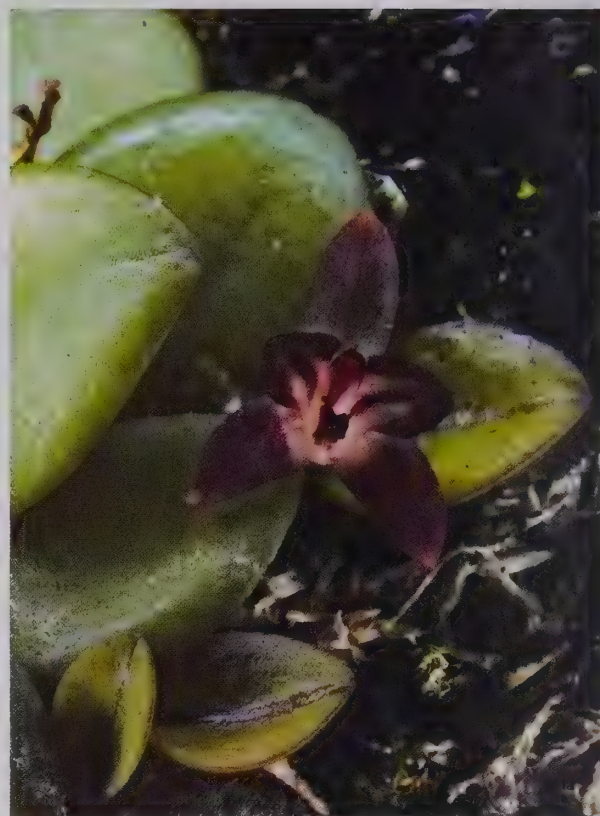


Figure 4.53 (above) *Anathallis nanifolia* leaves and flower (Grower: Orchid Mania).



Figure 4.54 (above) The tiny bloom of *Anathallis nanifolia* (Photo: Rogier van Vugt).

ANATHALLIS

Anathallis rabei (Foldats) Luer

Publication: *Monogr. Syst. Bot. Missouri Bot. Gard.* 115: 259 (2009)

Etymology: Named in honour of Marvin Rabe, who collected this species with Julian Alfred Steyermark in Trujillo, Venezuela, in September of 1966.

Homotypic synonyms: *Pleurothallis rabei* Foldats, *Specklinia rabei* (Foldats) Luer, *Panmorphia rabei* (Foldats) Luer.

Morphology: *Plant* 3–5.5 cm tall, clumping, branching, erect. *Ramicaul* 0.5–2 cm, erect, slender, enclosed in sheaths. *Leaf* 2–4 cm long by 1–1.5 cm wide, petiole 0.5–1 cm, elliptical-obovate, apex sub-acute to obtuse, lamina erect, leathery. *Inflorescence* a raceme, to 2 cm long including 0.5 cm peduncle, sub-flexuous, borne from node near apex of ramicaul. *Flower* 0.6–1 cm tall, few in number, successive (1–2 flowers open at a time), resupinate, widely spreading, pedicel 2–3 mm long. Flowers vary in size and colour.

Range, elevation and habitat: *Anathallis rabei* occurs in Venezuela (state of Trujillo), Colombia, Ecuador (province of Morona-Santiago) and Peru at elevations of 200–2500 m. This species occurs from tropical wet lowland forest to upper montane cloud forest. In Colombia, it was found growing in moist forest at elevations of 1900–2400 m. Conservation status unknown.

Culture recommendations: *Substrate* mount on tree fern, cork bark, or rough-barked hardwood with moss pad, or pot in New Zealand *Sphagnum* moss or fine bark mix. *Temperature* intermediate to cool. *Light* medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* easily by division, and from seed.

Comments: Under the right conditions, this plant is easy to grow and is a good species for a beginner. It is quite variable in leaf shape and in the shape and colour of the flower. A very similar species in cultivation, *Anathallis funerea* (formerly *Pleurothallis breviscapa*), also has reddish flowers. However, the flowers of *A. funerea* are narrower and somewhat hairy, but lack the long, whitish hairs seen in this species, in addition to being borne on a longer inflorescence. Like *A. rabei*, *A. funerea* may bloom in any month of the year, and even small specimens of the latter species may bloom almost continuously. Both species are well worth growing and very satisfying.



Figure 4.55 (above) The flower of *Anathallis rabei* is typically festooned with long, whitish hairs (Grower: J & L Orchids).



Figure 4.56 (above) *Anathallis funerea* has similar blooms, but these are narrower and less hairy (Grower: J & L Orchids).



Andinia (Luer) Luer

Publication: Luer, C. A., 2000, *Monogr. Syst. Bot. Missouri Bot. Gard.* 79: 5

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Andinia dielsii* (Mansf.) Luer, 2000, *Syst. Bot. Missouri Bot. Gard.* 79: 6.

Etymology: Named for the Andes mountains, where all known species occur.

Heterotypic synonym: *Lueranthos* Szlach. & Marg. This genus was formerly known as *Pleurothallis* subgenus *Aenigma* (Luer) and was elevated to genus status in 2000.

Profile: More than a dozen epiphytic species found at high elevations, from 1200–3400 m, occurring in scrub, moist or cloud forest in Colombia, Ecuador, Peru and Bolivia.

General plant morphology: Sympodial, creeping rhizome. Flower ovaries echinate to papillose, and trivalvate, lip entire to trilobed, column footless with dilated apex, anther apical.

General culture notes: Water with good quality water and fertilise at half strength weekly. For those collections grown in areas that experience winters with short day length and low light conditions, fertilisation should be reduced to 1/4 strength, twice per month, during the winter. These species have no dormancy. All species in this genus, as with most pleurothallids, are prone to bean yellow mosaic virus (BYMV). Care should be taken to prevent aphid infestations, as they are the vectors for the virus. Good aseptic technique should be followed when repotting the plants or when removing or trimming leaves and flowers.



Figure 4.57 (facing page) The woolly looking, characteristic flower of *Anathallis rabei* in detail (Grower: Mary Gerritsen).

Figure 4.58 (above) The delicate bloom of *Andinia pentamytera*, seen here in cultivation (Grower: Marni Turkel).

ANDINIA

Andinia lappacea (Luer) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 251 (2001)

Etymology: From the Latin *lappaceus* (like a burr) in reference to the soft spined ovary.

Homotypic synonym: *Pleurothallis lappacea* Luer

Morphology: Plant 9–13 cm long, creeping to pendent, rooting at the base, frequently branching, 0.1–0.3 cm between ramicauls, rhizome enclosed by bracts, leaves arranged in 2 to 3 rows. *Ramicaul* to 0.15 cm, suberect, enclosed in sheaths. *Leaf* 0.8–1 cm long by 0.7–0.9 cm wide, subpetiolate, orbicular to broadly elliptic, margin minutely denticulate, apex obtuse to rounded, and erose, lamina parallel to or barely ascending from the rhizome, thickly leathery. *Inflorescence* a raceme, short, peduncle 0.9–1 cm long, erect to suberect, relatively slender, borne from ramical. *Flower* 1.8–2.2 cm tall, to 4 in number, successive, facing outwards to nodding, resupinate, orange to yellow, fuzzy, pedicel 0.3 cm long.

Range, elevation and habitat: Endemic to Ecuador, this rare species is found in the provinces of Carchi and Zamora-Chinchi at 1200–1500 m, where it is found in wet, montane forest. This species blooms at any time of the year.

Culture recommendations: *Substrate* mount on cork or rough-barked hardwoods, possibly tree fern, using moss. Not suited to pot culture. *Temperature* intermediate to intermediate-cool. *Light* light shade to medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.

Comments: A rare species both in nature and in cultivation, *Andinia lappacea* deserves to be cultivated more widely by collectors who have the right growing conditions. The colourful yellow to orange flowers are larger than the leaves, and there always seem to be a few present on the plant. The habit of this species is quite striking, with a lovely chain of leaves dangling down from a mount. When pollinated, *A. lappacea* forms an interesting, burr-like seed pod. This species may bloom in any month in cultivation.



Figure 4.59 (above) An orange flowered form of the rare *Andinia lappacea* (Grower: Ron Parsons).



Figure 4.60 (above) A pair of yellow *Andinia lappacea* blooms (Grower: Marni Turkel).

ANDINIA***Andinia schizopogon*** (Luer) Pridgeon & M.W.Chase**Publication:** *Lindleyana* 16: 251 (2001)**Etymology:** From the Greek *schizo* (split) and *pogon* (beard) referring to the hairy, partially split synsepal.**Homotypic synonym:** *Pleurothallis schizopogon* Luer.

Morphology: *Plant* 3.5–12 cm tall, branching, scandent, erect to suberect, 0.5–2 cm between ramicauls. *Ramicaul* 1–2.5 cm long, erect, enclosed in sheaths. *Leaf* 2.5–6.5 cm long by 1–1.5 cm wide, gradually tapered to petiole, narrowly obovate, apex obtuse to rounded, and erose, lamina suberect to spreading, leathery, fleshy, rigid, finely marginate, underside punctate and often suffused with purple pigmentation. *Inflorescence* loose raceme, 5–15 cm (including peduncle) long, erect, filiform, terete, borne laterally from ramicaul. *Flower* 1.8–3 cm tall, single, 3–6 in number, successive, resupinate, widely spreading, lateral sepals can be mostly free or fused for much to nearly all of their length. This species varies in flower size, and degree of hairiness.

Range, elevation and habitat: *Andinia schizopogon* occurs in southeastern Ecuador (provinces of Azuay, Loja, Zamora-Chinchipe) and Peru (department of Cuzco) at altitudes of 2200–3200 m in high elevation, cold cloud forest and trees on the páramo. This species blooms from September through March. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork or rough-barked hardwoods, possibly tree fern, or pot using moss or fine bark mix. *Temperature* cool to cold. *Light* bright diffused. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: This rare species is quite striking; the flowers have an outstretched stance, with elongated petals and sepals and long, pink to reddish hairs on the lateral sepals. Available several years ago, this species is not seen frequently in collections, possibly because it requires quite cold conditions and resents warmth, even for a brief time. There appear to be both small and large-flowered forms, and the latter are the more appealing. There is also a form that lacks the sepal hairs, though this could possibly represent a different species. In cultivation, *Andinia schizopogon* blooms in the autumn to winter.



Figure 4.61 (above) The leaves and flower of *Andinia schizopogon* (Grower: Marni Turkel).

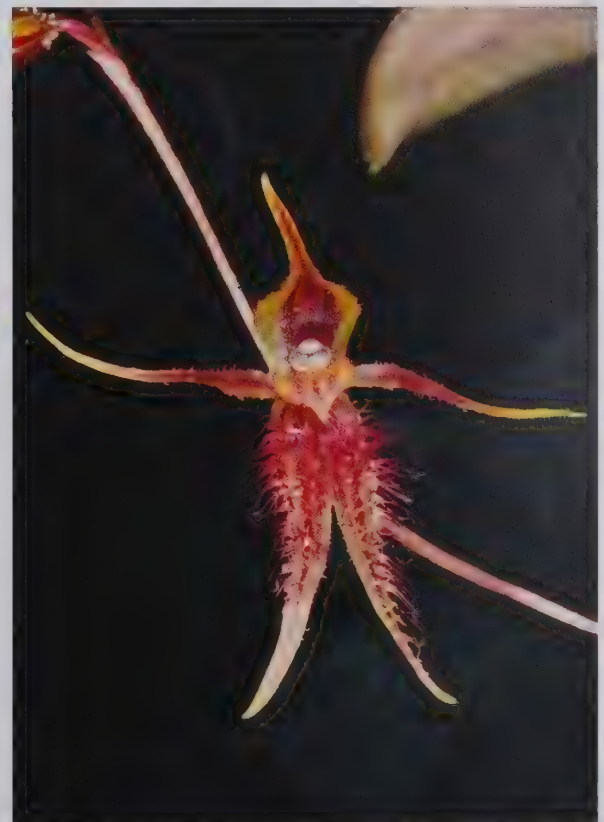


Figure 4.62 (above) An *Andinia schizopogon* bloom (Grower: Hanging Gardens).



Angraecum Bory

Publication: Bory, J. B. G. M., 1804, *Voy. îles Afrique* 1: 359

Subfamily: Epidendroideae

Tribe: Vandae

Subtribe: Angraecinae

Etymology: From *angurek*, a bastardisation of the Bahasa Malay word *anggrek* (orchid), used for any orchid with aerial roots.

Type species: *Angraecum eburneum* Bory, 1804, *Voy. îles Afrique* 1: 359.

Profile: A genus of over 220 epiphytic and lithophytic species, ranging from West, Central and South Africa to Madagascar, its adjacent islands, and Sri Lanka.

General plant morphology: Monopodial epiphytes or lithophytes ranging in size from minute to very large, the stems sometimes branching, leaves usually distichous, leaf bases imbricate. *Leaf* variable in shape, the apex often bilobate. *Inflorescence* usually unbranched, axillary. *Flower* variable in size, usually white, green or yellowish, sepals and petals subsimilar, usually spreading, with nectary of varying lengths, lip entire or trilobed, base more or less surrounding short column, cleft in front, pollinia 2, most species fragrant at night, pollinated by various moth species.



Figure 4.63 (facing page) A mounted plant of *Andinia lappacea* bearing numerous orange blooms (Grower: Marni Turkel).

Figure 4.64 (above) A trio of *Angraecum sedifolium* blooms in cultivation (Grower: Brad Cotten).

ANGRAECUM

Angraecum cucullatum Thouars

Publication: *Hist. Orchid.*:t. 48 (1822)

Etymology: From the Latin *cucullata* (hooded), referring to the hooded column.

Homotypic synonyms: *Aerobion cucullatum* (Thouars) Spreng., *Angorchis cucullata* (Thouars) Kuntze, *Macrolepactrum cucullatum* (Thouars) Finet.

Heterotypic synonyms: *Angorchis cucullangis* Thouars ex Kuntze, *Angorchis fragrangis* Thouars ex Kuntze.

Morphology: *Plant* 4–12 cm wide by 1–5 cm tall. *Stem* erect, thickened, covered with old leaf bases, leaves 2–5 in number, occasionally branching at base. *Leaf* 2–6 cm long by 0.5–0.9 cm wide, folded at base, linear oblong to linear ligulate, unequally bilobate at apex, lamina V-shaped in cross section, leathery, rigid. *Inflorescence* a raceme, 3–4 cm long. *Flower* 1.5–2 cm in diameter, single, resupinate, widely spreading, fragrant at night.

Range, elevation and habitat: *Angraecum cucullatum* occurs on the islands of Réunion and Mauritius, where it grows as an epiphyte on the trunks of old trees in dense forest, relatively close to the ground. This species blooms in the summer in nature (December–March).

Culture recommendations: *Substrate* mount on cork or rough-barked hardwood, using a little moss, or potted. If potted, it is perhaps best underpotted in an open bark mix and allow to approach dryness before watering. *Temperature* warm to intermediate. *Light* bright diffused to light shade. *Watering* moisten, then allow to approach dryness before watering again. Reduce water in winter. *Humidity* high. *Air movement* good. *Propagation* possible by division, and also from seed.

Comments: *Angraecum cucullatum* is rare in cultivation, and should be propagated by seed if possible. It has beautiful flowers that are pleasingly fragrant at night. This species belongs to the section *Perrierangraecum*. In cultivation this species blooms during the summer. It has a reputation of being difficult to grow.



Figure 4.65 (above) The bloom of *Angraecum cucullatum* (Grower: Fred Hillerman).

ANGRAECUM

Angraecum equitans Schltr.

Publication: *Beih. Bot. Centralbl.* 34(2): 339 (1916)

Etymology: From the Latin *equitans* (astride) referring the leaf-bases that sit astride the stem.

Morphology: *Plant* 6–12 cm wide, stem to 10 cm tall, erect, compact, sometimes branching, leaves distichous, several. *Leaf* 3–6 cm long by 1.1–2.2 cm wide, conduplicate, overlapping at base, apex slightly bilobate, lamina perpendicular to stem, spreading, slightly curved, leathery, rigid, rugose, fleshy. *Inflorescence* a raceme, very short, to 1 cm long. *Flower* to 4.5 cm wide, 1–3 in number, simultaneous, resupinate, spreading, filiform spur 8–11 cm long, funnel shaped at base, then tapering.

Range, elevation and habitat: *Angraecum equitans* is endemic to Madagascar (provinces of Antsiranana, Fianarantsoa and Toamasina) where it grows as an epiphyte in full sun, usually on the outer thin branches of trees, in highland mossy forest and lichen-rich evergreen forest with year round high humidity and mists. It occurs at elevations of 1000–2600 m. This species blooms during the rainy season of spring and summer in nature. Conservation status unknown, but likely threatened due to human activities.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, using New Zealand *Sphagnum* moss, or pot in fine to medium bark mix in as small a pot as is feasible. *Temperature* intermediate. Plants from higher elevations have warm days and cool nights, occasionally encountering light frosts during the winter. *Light* bright to bright-diffused. *Watering* keep moist, not wet. Keep somewhat drier during winter in areas with short winter days and reduced light. *Humidity* high. *Air movement* good. *Propagation* possibly by division, seed. *Fertilise* at 1/4 to 1/2 strength weekly during the active growing season, but reduce to 1/4 strength once or twice a month during winter.

Comments: *Angraecum equitans* is not common, and where possible it should be propagated by seed. The flowers and plants are similar to, and often confused with, the slightly larger *A. compactum*, but the lateral sepals of the latter are convex and usually curved inwards. This species has somewhat large, beautifully shaped flowers that are nocturnally fragrant. It belongs to section *Perrierangraecum*. In cultivation it blooms in late spring to early summer.

Figure 4.68 (overleaf) The pretty flower of *Angraecum equitans*, an uncommon taxon from Madagascar (Grower: Brad Cotten).

Figure 4.69 (following page) A mounted *Angraecum compactum* bearing three simultaneous, fine blooms (Grower: Cindy Hill).



Figure 4.66 (above) The bloom and fleshy leaves of *Angraecum equitans* (Grower: Orchid Species Plus).



Figure 4.67 (above) *Angraecum compactum* has a similar flower (Grower: Cindy Hill).





ANGRAECUM

Angraecum rutenbergianum Kraenzl.

Publication: *Abh. Naturwiss. Vereine Bremen* 7: 257 (1882)

Etymology: Named in honour of naturalist, plant collector and traveller, Diedrich Christian Rutenberg (1851–1878), who died in Madagascar.

Homotypic synonym: *Jumellea rutenbergiana* (Kraenzl.) Schltr.

Morphology: Plant to 12 cm wide by 4–12 cm tall, slowly elongating with age, occasionally branching at base, leaves distichous, 4–12 in number, proportionately large verrucose roots. Leaf 2.5–6 cm long by 0.5–0.8 cm wide, slightly folded, more so at base, strap like, apex unequally bilobate, lamina rigid, leathery, thick, verrucose. Inflorescence a raceme, 0.5–1 cm long, one to several simultaneous inflorescences, axillary, piercing leaf at base. Flower proportionately large, to 5.5 cm wide (7 cm in cultivation), single, resupinate, widely spreading, crystalline, spur 10–15 cm long. Blooms pleasantly scented at night.

Range, elevation and habitat: *Angraecum rutenbergianum* is found in the central highlands of Madagascar (provinces of Antananarivo, Fianarantsoa, and Toliara) at elevations of 1500–2600 m. It has been collected on Mt. Tsaratanana. It grows as an epiphyte on tree trunks and branches, both near the ground and at reasonable height, as well as lithophytically on rocks and boulders in detritus-filled fissures. It grows in a variety of habitats including seasonal rainforest, humid evergreen forest, drier forests and dry scrub. It grows in full sun to ~50 % shade in scrub and bushes. In its native habitat, *A. rutenbergianum* experiences both rainy and dry seasons with hot days and cooler nights. In the dry, cool winter season it can experience brief, early-morning frosts. It experiences high humidity only during the wet season (mid-summer), when most growth occurs and the plants bloom.

Culture recommendations: *Substrate* best mount on cork bark or rough-barked hardwood, using only a little moss. If potted, using a small pot and an open, well-drained bark mix. *Temperature* prefers warm days (warm to intermediate temperatures) and cool nights to (10 °C) 50 °F. Plants can take to near-freezing temperatures during the winter if kept dry. *Light* bright to bright-diffused. *Watering* allow plants to dry briefly between waterings. Plants should be kept much drier during winter. *Humidity* high during growing season, but average during the remainder of the year. *Air movement* good to strong. *Propagation* possibly division, seed.

Comments: *Angraecum rutenbergianum* is rare in cultivation; it is often confused with *A. didieri* as the flowers and plants are very similar. The most consistent difference is the smaller plant size of *A. rutenbergianum*. The proportionately large, elegant, starry flowers always attract attention, and have the additional attraction of a wonderful nocturnal fragrance. The flowers should be kept dry to avoid premature aging and spotting. The plants bloom from late spring into summer in cultivation, but have also been noted in early autumn. This species belongs to the section *Perrierangraecum*.

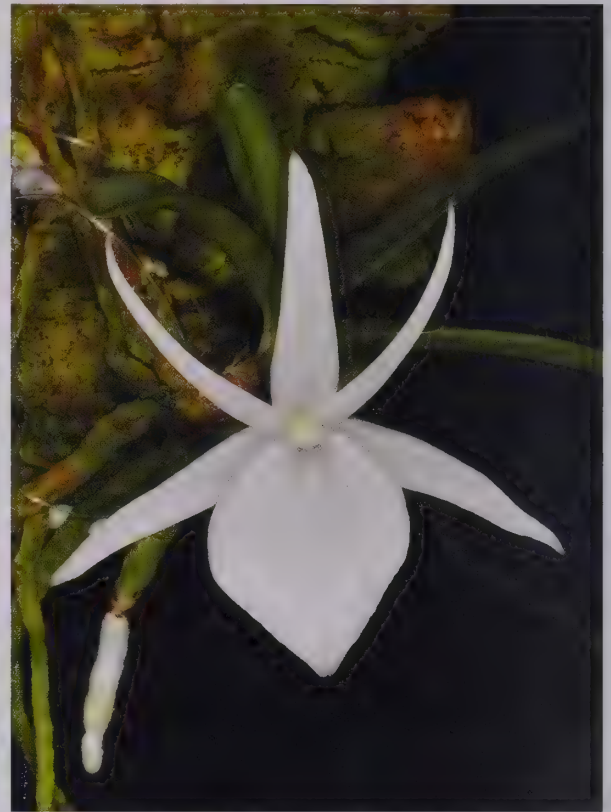


Figure 4.70 (above) The spectacular and elegant flower of *Angraecum rutenbergianum* is a rare sight in cultivation (Grower: Cindy Hill).



Figure 4.71 (above) *Angraecum didieri* is very similar to *A. rutenbergianum*, but grows substantially larger (Grower: White Oak Orchids).



Figure 4.72 (above) An *in situ* *Angraecum rutenbergianum* plant growing in a rock crevice in the highlands of Madagascar (Photo: Johan Hermans).

Figure 4.73 (below) Individual *Angraecum rutenbergianum* plants may produce a number of simultaneous blooms (Grower: Ron Parsons).

ANGRAECUM

Angraecum sedifolium Schltr.

Publication: *Repert. Spec. Nov. Regni Veg. Beih.* 33: 316 (1925)

Etymology: From the Latin *sedi* (stonecrop, sedum) and *folia* (leaf), referring to the succulent leaves that are reminiscent of those of the genus *Sedum* (Crassulaceae).

Morphology: *Plant* to 5 cm wide by 15 cm tall, erect to pendent, leaves many, arranged sub-spirally, roots slender. *Stem* to 13 cm long, round in cross-section. *Leaf* 1.5–2.5 cm long by 0.2–0.4 cm wide, broader at base, sub-triangular, acuminate, apex obtuse to rounded, lamina spreading to suberect, straight to curved, sulcate, rigid, fleshy, rugulose, punctate on ventral surface. *Inflorescence* a raceme, approximately equal in length to leaves, 1 to 2 simultaneous inflorescences per growth, suberect to horizontal, filiform. *Flower* 0.8 by 1 cm tall, 1 (occasionally two) in number, simultaneous, resupinate, spreading widely, segments somewhat reflexed, spur suberect, 1.3–1.7 cm long, fragrant.

Range, elevation and habitat: *Angraecum sedifolium* is endemic to the highlands of central Madagascar, where it grows in moss forest and lichen rich evergreen forest as an epiphyte at elevations of 900–2000 m. This species has been collected on Mt. Tsiafajavona. It is quite common in nature, and blooms from December to March.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, using New Zealand *Sphagnum* moss. Perhaps best suited to mounts, but moss should be used if potting. *Temperature* warm to intermediate days, nights to 13 °C (55 °F). *Light* bright-diffused to light shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* easily by division, seed. *Fertilise* at 1/4 to 1/2 strength weekly throughout the year.

Comments: *Angraecum sedifolium* is uncommon in cultivation, but has recently become more available. Plants readily produce side growths, permitting vegetative propagation. Somewhat camouflaged when blooming due to their green colour, the unusual flowers are of decent size and sweetly fragrant at night. The rigid, upturned spur is an attractive feature. The whorl-like arrangement of the succulent leaves represents an usual pattern for an *Angraecoid*, or indeed any sort of monopodial orchid. Plants tend to bloom in the late fall or early winter in cultivation. This species belongs in section *Angraecoides*.

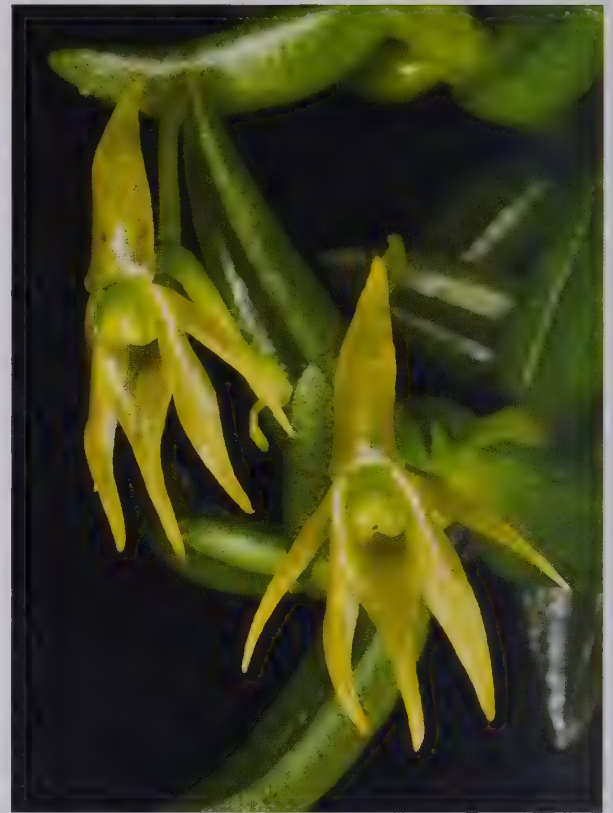


Figure 4.74 (above) The *Angraecum sedifolium* plant (Grower: Brad Cotten).

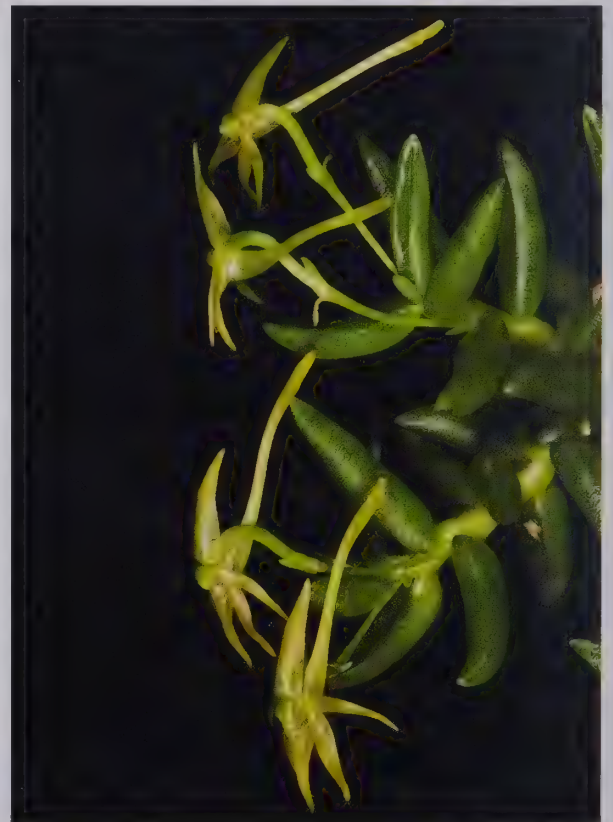


Figure 4.75 (above) The *Angraecum sedifolium* plant (Grower: Brad Cotten).

ANGRAECUM***Angraecum urschianum* Toill. -Gen. & Bosser****Publication:** *Adansonia*, n.s. 1: 101 (1961)**Etymology:** Named in honour of French plant collector, Eugene Ursch (1882–1962), former Director of the Botanical and Zoological Garden at Tsimbazaza, Madagascar.**Morphology:** *Plant* to 4.5 cm wide and 4 cm tall, occasionally branching, leaves distichous, closely set, overlapping, few to 15 in number. *Leaf* 0.8–2.3 cm long by 0.5–0.8 cm wide, conduplicate, linear to oblong, apex rounded and bilobate, lamina leathery, fleshy, margins denticulate, ventral and dorsal surface much spotted, rugose, dark green, ventral side greyish green with dark green pitting. *Inflorescence* a raceme, much abbreviated, erect to suberect. *Flower* to 2.5 cm wide, single, resupinate, spreading, petals tending to reflex backwards, sepals and lips jutting forward, pedicel to 0.9 cm, spur pendent, slender, filiform, to 12 cm long, fragrant.**Range, elevation and habitat:** *Angraecum urschianum* is endemic to eastern Madagascar (Moramanga region, province of Toamasina), where it grows as an epiphyte in rainforest and humid, evergreen, mossy forest at elevations ranging from 800–1200 m. This species blooms in September (generally early spring in the southern hemisphere) in nature. Conservation status unknown, but likely threatened due to human activities.**Culture recommendations:** *Substrate* mount on cork bark or rough-barked hardwood using a little pad of New Zealand *Sphagnum* moss. Not well suited to pot culture. *Temperature* warm days, intermediate nights. *Light* bright diffused. *Watering* moist, well-drained, allow to approach dryness or dry briefly before watering again. It is probably best to reduce water in collections grown in areas with short winter days and prolonged periods of overcast skies. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 to 1/2 strength weekly, but reduce to 1/4 strength once or twice per month during winter.**Comments:** Considered a true collector's item, plants of this species are relatively rare in cultivation and, when available, tend to be expensive. A very similar species has recently been imported from Madagascar incorrectly identified as *Angraecum breve*. That taxon is not *A. breve*, which is a different species entirely, but instead lies very close to *A. urschianum*, differing principally in having no spots on its leaves. *Angraecum urschianum* is a small, beautiful plant, and its dimpled, patterned leaves, are striking in their own right, while its captivating and proportionately large flowers only add to its overall charm. The only plants seen to date in cultivation bloomed in later winter. This species belongs in the section *Perrierangraecum*.**Figure 4.78 (overleaf)** The beautiful bloom and attractive leaves of *Angraecum urschianum* (Grower: Botanica Ltd).**Figure 4.79 (following page)** A wonderful flower of *Angraecum* cf. *urschianum*, sold incorrectly labelled as *A. breve* (Grower: Cindy Hill).**Figure 4.76 (above)** The *Angraecum urschianum* plant (Grower: Cindy Hill).**Figure 4.77 (above)** The attractive growths of an *Angraecum urschianum* plant (Grower: Jacob Knecht).





Ascocentrum Schltr.

Publication: Schlechter, F. R. R., 1913, *Repert. Spec. Nov. Regni Veg. Beih.* 1: 975

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Aeridinae

Type species: *Ascocentrum miniatum* (Lindl.) Schltr., 1913, *Repert. Spec. Nov. Regni Veg. Beih.* 1: 975.

Etymology: From the Greek *askos* (bag) and *kentron* (spur) referring to the often large spur.

Profile: *Ascocentrum* is a genus of approximately 13 species found from northeast India and across southeast Asia to Taiwan, the Philippines, Sulawesi, Borneo, Java and Sumatra.

General plant morphology: Monopodial epiphyte, stems short, branching at base, erect, rooting at base, leaves distichous. *Leaf* narrowly strap shaped, curved to straight, often V-shaped in cross-section, fleshy, leathery. *Inflorescence* densely flowered, erect, axillary. *Flower* small, sepals and petals spreading, subsimilar, free, often brightly coloured, lip entire or trilobed, fixed to the base of the column, spur shorter than pedicel and ovary, column short, pollinia 2.



Figure 4.80 (above) A group of *Ascocentrum pumilum* plants in full bloom is beautifully displayed on a hardwood mount (Grower: Alfred Hockenmaier, Photo: Joe Herbert).

ASCOCENTRUM

Ascocentrum pumilum (Hayata) Schltr.

Publication: *Rept. Spec. Nov. Regni Veg. Beih.* 4: 285 (1919)

Etymology: From the Latin *pumilus* (dwarf, low, small, short), referring to the diminutive size of the plant.

Homotypic synonyms: *Saccolabium pumilum* Hayata, *Ascolabium pumilum* (Hayata) S.S.Ying.

Morphology: *Plant* to 7 cm tall, 8–12 cm wide, single to branching at base forming small clumps, stem elongating with age, leaves distichous, imbricate, several to many. *Leaf* to 8 cm long by 0.3–0.4 cm wide, narrowly ligulate, apex acute, apiculate, lamina straight to slightly recurved, leathery, fleshy, slightly flexible, dorsally sulcate. *Inflorescence* umbellate raceme, up to 4 simultaneous inflorescences, shorter than leaf, peduncle 2–4 cm long, borne from near leaf base. *Flower* 0.7–1 cm in diameter, to 10 in number, simultaneous, campanulate to widely spreading, varying from pale to rich pink.

Range, elevation and habitat: *Ascocentrum pumilum* is endemic to Taiwan, where it is common in broadleaf forest in the central mountain range at elevations of 1000–2000 m. It grows as an epiphyte high in the trees on mossy trunks and large branches.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood using a small pad of moss, or pot in fine to medium bark mix. *Temperature* intermediate. Plants of this species are grown outside in southern California where they regularly survive temperatures as low as 3 °C (36 °F). *Light* bright diffuse to light shade. *Watering* moist, drying briefly between watering. Do not keep wet. Probably best to reduce water during winter. *Humidity* high. *Air movement* good. *Propagation* by division or by seed. *Fertilise* at 1/4 to 1/2 strength weekly during the growing season, but reduce to 1/4 strength once or twice per month during winter.

Comments: *Ascocentrum pumilum* is the smallest species in the genus and also among the least commonly seen. Most plants sport the brightly coloured flowers that are so typical of the genus *Ascocentrum*, but there is also a rare white (*alba*) form. When grown on a mount, the needle-like leaves eventually form an attractive, if slow growing, clumping plant. This species can tolerate cooler temperatures than most of its congeners. In cultivation, *Ascocentrum pumilum* generally blooms in the winter, though blooms have also been noted in the summer.



Figure 4.81 (above) The pretty flowers of *Ascocentrum pumilum* (Grower: Mary Gerritsen).

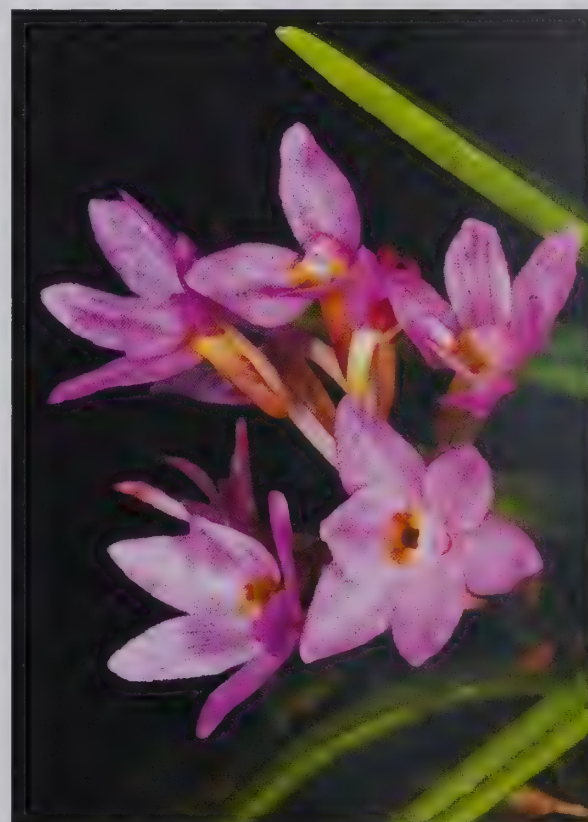


Figure 4.82 (above) *Ascocentrum pumilum* may produce up to ten simultaneous blooms (Grower: Chaunie Langland).

Barbosella Schltr.

Publication: Schlechter, F. R. R., 1918, *Repert. Spec. Nov. Regni Veg.* 15: 259

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Barbosella gardneri* (Lindl.) Schltr., 1918.

Heterotypic synonym: *Barbrodria* Luer, nom. illeg.

Etymology: Named for João Barbosa Rodriguez (1842–1909), Brazilian botanist and director of the Botanic Garden in Manaus, and later of the Botanical Garden of Rio de Janeiro, known for his pioneering work in the systematic studies of Brazilian orchidaceae.

Profile: A genus of over 40 epiphytic, terrestrial and lithophytic species occurring from lowland (100 m in the state of Paraná, Brazil) to highland (to 3500 m in the Colombian Andes) habitats in Central America (Guatemala) south to the Andes, and in southern Brazil and adjacent Argentina, with one species known from the Antilles.

General plant morphology: Plant sympodial, clumping or creeping. *Ramicaul* erect, enclosed in 1 or more sheaths, unifoliate. *Leaf* linear to oblong, fleshy or leathery. *Inflorescence* erect, terminal from ramicaul, within a papery sheath. *Flower* single, dorsal sepal free, lateral sepals connate for majority to entirety of length to form synsepal, petals free, sometimes fringed, lip shorter than sepals, fleshy, strap shaped to ovate, hinged at base to column foot, column usually winged, hooded, with foot, pollinia 4.

General culture notes: Plants of this genus are prone to bean yellow mosaic virus (BYMV). Care should be taken to prevent aphid infestations, as they are the vectors for the virus.



Figure 4.83 (above) Plants of a *Barbosella* sp. growing in large clumps on a tree near a river, municipality of São Miguel Arcanjo, São Paulo, Brazil (Photo: Leonardo Desordi Lobo).

BARBOSELLA

***Barbosella australis* (Cogn.) Schltr.**

Publication: *Repert. Spec. Nov. Regni Veg.* 15: 260 (1918)

Etymology: From the Latin *australis* (southern), referring to the distribution of this species when it was included in *Restrepia*.

Homotypic synonyms: *Restrepia australis* Cogn., *Barbosella australis* var. *genuina* Hoehne, nom. inval.

Heterotypic synonyms: *Restrepia loefgrenii* Cogn., *Barbosella loefgrenii* (Cogn.) Schltr., *Barbosella australis* var. *latipetala* Hoehne, *Barbosella australis* var. *loefgrenii* (Cogn.) Hoehne.

Morphology: *Plant* 1.7–3 cm tall, mat forming, creeping, branching, rhizomes to 20 cm, 0.5–1 cm between ramicauls. *Ramicaul* 0.2–0.5 cm long, ascending, cylindrical, enclosed in sheaths. *Leaf* 2–2.5 cm long by 0.5–1.1 cm wide, shortly petiolate to sessile, folded at the base, elliptic-oblong, apex acute, lamina suberect, fleshy, rigid, often suffused with purple pigment. *Inflorescence* a raceme, 1.5–3.5 cm long, erect, terete, slender. *Flower* 2–2.4 cm tall, proportionately large, single, resupinate, thin textured, widely spreading, campanulate, pedicel 0.1 cm long.

Range, elevation and habitat: *Barbosella australis* is found in southern Brazil (states of Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul) at elevations close to 1500 m where it is locally common. It grows epiphytically in very humid, moist, shady primary montane forest on the trunks and branches of trees. In nature it blooms between February and March.

Culture recommendations: *Substrate* Due to its rambling habit, this species is best mounted. It will do well on tree fern totems, but also on cork with some New Zealand *Sphagnum* moss. Not well suited to pot culture due to the creeping rhizome. *Temperature* intermediate-cool to cool. It can withstand brief day temperatures to 32 °C (90 °F) and occasionally near freezing temperatures at night during the winter, though it is best kept above 10 °C (50 °F). *Light* light shade to medium shade. *Watering* moist, well-drained, but can take brief periods of dryness if humidity is high.

Humidity high. *Air movement* low and steady to good. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser in winter months.

Comments: This is perhaps the finest species in the genus; it has proportionately huge flowers that are often larger than the leaves, with an unusual shape for the genus, being relatively broad and slightly scoop-shaped. Typically blooming in winter (December to January in the northern hemisphere) in cultivation, and often *en masse*, the individual flowers are fairly long lasting (2–3 weeks), and a plant may produce flowers for 5–6 weeks. The species can survive brief periods of near-freezing temperatures. Highly recommended!



Figure 4.84 (above) The fine flowers of *Barbosella australis* (Grower: Ron Parsons).



Figure 4.85 (above) Numerous *Barbosella australis* leaves and flowers cover this mount (Grower: Ron Parsons).

BARBOSELLA

Barbosella cogniauxiana (Speg. & Kraenzl.) Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 15: 260 (1918)

Etymology: Named in honour of Alfred C. Cogniaux (1841–1916), a Belgian botanist well known for his work on Brazilian orchids.

Homotypic synonyms: *Restrepia cogniauxiana* Speg. & Kraenzl., *Pleurothallis spegazziniana* L.O. Williams

Heterotypic synonyms: *Restrepia porschii* Kraenzl., *Barbosella porschii* (Kraenzl.) Schltr., *Barbosella handroi* Hoehne, *Barbosella riograndensis* Dutra ex Pabst

Morphology: Plant 1–2.9 cm tall, mat forming, creeping, frequently branching, 0.3–0.8 cm between ramicauls, vegetatively variable. *Ramicaul* 0.2–0.4 cm, slender, ascending to erect, enclosed in sheaths. *Leaf* 0.8–2.5 cm long by 0.3–0.7 cm wide, tapering to a subpetiolate base, broadly to narrowly elliptical, apex acute to obtuse, lamina erect to suberect, thickly leathery. *Inflorescence* a raceme, 3–5 cm long, erect, filiform. *Flower* 2.2–3 cm tall, single, resupinate, thin textured, widely spreading, pedicel 0.1 cm.

Range, elevation and habitat: *Barbosella cogniauxiana* is the most widespread of the Brazilian *Barbosella*, occurring in southern Brazil (states of São Paulo, Rio de Janeiro, Paraná, Santa Catarina, and Rio Grande do Sul) and northern Argentina (province of Misiones) at elevations of 100–900 m in low to mid-elevation, moist montane forest. This relatively common species blooms from October to November in nature.

Culture recommendations: *Substrate* Due its rambling habit, this species does best mounted on tree-fern plaques and totems, as well as on cork, using New Zealand *Sphagnum* moss. Not suited to pot culture. *Temperature* intermediate to cool. This species can take brief periods to 32 °C (90 °F) as well as occasional drops to near freezing temperatures on winter nights. *Light* light shade to medium shade. Too much light will bleach the leaves. *Watering* moist, well-drained, but can take brief dry periods provided humidity is high. *Humidity* high. *Air movement* good. *Propagation* easily by division, or seed.

Comments: A prolific grower when happy, *Barbosella cogniauxiana* is a mass bloomer, making incredible displays of flowers that, held high above the leaves on long pedicels, sway with the slightest air movement. Although it is from relatively low elevations in nature, it can withstand quite cool temperatures in winter, to near freezing for brief periods provided it is dry. Its summer to autumn blooming habit may shorten the life of the flowers for some growers. When grown well, the plant itself is beautiful, and divisions can be easily removed without damaging its appearance. *Barbosella cogniauxiana* is closely related to *B. prorepens*.



Figure 4.86 (above) A spectacular specimen plant of *Barbosella cogniauxiana* covering its mount (Grower: Judy Carney).



Figure 4.87 (above) *Barbosella cogniauxiana* mass blooms (Grower: Hanging Gardens).

Figure 4.88 (facing page) A *Barbosella cogniauxiana* 'Hillside' quintet (Grower: Ron Parsons).



BARBOSELLA

Barbosella cucullata (Lindl.) Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 15: 261 (1918)

Etymology: From the Latin *cucullatus* (hooded), referring to the apex of the column.

Homotypic synonyms: *Restrepia cucullata* Lindl., *Pleurothallis angustisegmenta* C.Schweinf.

Heterotypic synonyms: *Restrepia rhynchantha* Rchb.f. & Warsz., *Restrepia varicosa* Lindl., *Restrepia antennifera* var. *angustifolia* Kraenzl., *Masdevallia longiflora* Kraenzl., *Barbosella rhynchantha* (Rchb.f. & Warsz.) Schltr., *Barbosella varicosa* (Lindl.) Schltr., *Barbosella longipes* Schltr., *Barbosella longiflora* (Kraenzl.) Schltr., *Pleurothallis rhynchantha* (Rchb.f. & Warsz.) L.O.Williams.

Morphology: Plant 3.5–14 cm tall, mat forming, branching, clumping to creeping (sometimes on the same plant), 0.3–3 cm between ramicauls. *Ramicaul* 0.5–2 cm, stout, erect to suberect, enclosed in sheaths. *Leaf* 3–12 cm long by 0.5–1 cm wide, subpetiolate, linear-obovate, apex subacute to obtuse, semi-terete, lamina erect to suberect, thickly leathery, fleshy. *Inflorescence* a raceme, 8–18 cm long, usually longer than leaves, erect, slender. *Flower* 5–8.5 cm tall, single, resupinate, thin textured, widely



Figure 4.89 (above) The delicate looking flower of *Barbosella cucullata* (Grower: John Leathers).



Figure 4.90 (above) *Barbosella cucullata* plants growing *in situ* in Ecuador (Photo: Andreas Kay).

BARBOSELLA

spreading, pedicel 0.1–0.2 cm. This species is extremely variable in plant size, growth habit, and flower size and colour, which ranges from yellowish green to green, bronze or reddish.

Range, elevation and habitat: *Barbosella cucullata* is a widespread and locally common species that occurs in Venezuela (states of Carabobo, Tachira and Yaracuy), Colombia (departments of Antioquia, Cauca Cundinamarca, Nariño, Norte de Santander, Putumayo, Tolima and Valle del Cauca), Ecuador (provinces of Azuay, Bolivar, Carchi, Imbabura, Loja, Morona-Santiago, Napo, Pichincha, Tungurahua, and Zamora-Chinchipe), Peru (departments of Cajamarca, Cusco and Pasco) and Bolivia (departments of Cochabamba and La Paz) at elevations of 1400–3500 m in moist montane woods, wet forest, cloud forest and even páramo; it has been found in both sunny and shady conditions. In sunlight, this species is clump forming, whereas in shade it is creeping. *Barbosella cucullata* grows as an epiphyte or as a lithophyte in mossy conditions.

Culture recommendations: *Substrate* best mounted on tree fern plaques or totems, or on cork bark with New Zealand *Sphagnum* moss, or potted using moss or a fine bark mix. *Temperature* intermediate to cold, depending on the provenance of your plant. If uncertain, intermediate-cool temperatures are best. *Light* bright diffuse to medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good at all times. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser in winter.

Comments: A species that is easy to grow under the right conditions, *Barbosella cucullata* is incredibly variable; plants may be small or large, the large forms representing the largest plants of the genus, clump or creep (sometimes on the same plant), produce flowers of varying size, but also including the largest in the genus, and exhibit a variety of colours. In the opinion of the authors, the two best flower forms are the large greenish yellow form and the large red form with whitish edges, which may reach 7 cm long. The latter form may prove to be a distinct species in its own right. In cultivation, the plants typically bloom in autumn to winter.



Figure 4.91 (above) *Barbosella cucullata* maroon form (Grower: Marni Turkel).



Figure 4.92 (above) Flowers of a *Barbosella cucullata* red form (Grower: Marni Turkel).

Figure 4.93 (overleaf) Flower detail of a *Barbosella cucullata* yellow form (Grower: Steve Beckendorf).



BARBOSELLA

Barbosella miersii (Lindl.) Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 15: 262 (1918)

Etymology: Named in honour of British botanist and engineer, John Miers (1789–1879), best known for his work on the flora of Chile and Argentina, and the first collector of this species.

Homotypic synonyms: *Pleurothallis miersii* Lindl., *Restrepia miersii* (Lindl.) Rchb.f., *Humboltia miersii* (Lindl.) Kuntze, *Barbrodria miersii* (Lindl.) Luer.

Morphology: *Plant* tiny, 0.4–1 cm tall, forming dense, moss-like mats, creeping, frequently branching, 0.1–0.5 cm between ramicauls. *Ramicaul* 0.1–0.3 cm, ascending, slender, enclosed in sheaths. *Leaf* 0.3–0.7 cm long by 0.2–0.3 cm wide, elliptical, apex acute to sub-acute, apiculate, lamina suberect to prostrate, leathery. *Inflorescence* a raceme, 0.7–1 cm long, erect, filiform. *Flower* 0.3–0.4 cm tall, single, resupinate, thin textured, widely spreading, pedicels minute.

Range, elevation and habitat: *Barbosella miersii* is found in Brazil (states of Paraná, Santa Catarina, Rio de Janeiro and São Paulo) in very humid, moist, primary forest, at around 1000 m in elevation. This species forms large, dense mats, and is quite common on mossy branches and trunks in shady conditions. This species blooms in October in nature.

Culture recommendations: *Substrate* mount on dense tree fern or cork bark using a pad of New Zealand moss. Not suited to pot culture. *Temperature* intermediate cool to cool. *Light* medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* low and steady to good as long as it doesn't dry plant out. *Propagation* easily by division, or seed.

Comments: *Barbosella miersii* is not commonly seen in cultivation, perhaps due to the difficulty of importing the fragile plants. This minute, delicate species displays its tiny flowers high above the leaves. Care must be taken to prevent moss from overgrowing these miniature plants, as moss growth may eventually overcome their diminutive growths.



Figure 4.94 (above) The fragile, thin textured bloom of *Barbosella miersii* (Grower: Brad Cotten).



Figure 4.95 (above) A fingertip dwarfs the tiny, perfectly miniature flower of *Barbosella miersii* (Photo: Roberto Martins).

BARBOSELLA

Barbosella prorepens (Rchb.f.) Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 15: 263 (1918)

Etymology: From the Latin *prorepens* (creeping out, creeping forward), referring to the growth habit of the plant.

Homotypic synonyms: *Restrepia prorepens* Rchb.f., *Pleurothallis prorepens* (Rchb.f.) Ames.

Heterotypic synonyms: *Pleurothallis dussii* Cogn., *Barbosella brenesii* Schltr., *Pleurothallis monstrabilis* Ames, *Restrepia caespitifolia* F.Lehm. & Kraenzl., *Restrepia tolimensis* Kraenzl., *Barbosella caespitifolia* (F.Lehm. & Kraenzl.) Garay, *Barbosella monstrabilis* (Ames) Garay, *Barbosella tolimensis* (Kraenzl.) Garay, *Barbosella dussii* (Cogn.) Dod.

Morphology: Plant 1.7–5.5 cm tall, clumping to shortly repent, frequently branching, mat forming, ascending to suberect. *Ramicaul* 0.2–0.5 cm, erect, enclosed in sheaths. *Leaf* 1.5–5 cm long by 0.2–0.4 cm wide, subpetiolate, narrowly obovate, apex sub-acute, sometimes semi-terete or triquetrous, lamina erect, fleshy, leathery. *Inflorescence* a raceme, 2–5 cm long, erect, slender. *Flower* 1.8–3 cm tall, single, resupinate, thin textured, widely spreading, pedicel minute. Plants vary in growth habit and individuals may be both repent and caespitose. Plant size, flower size, and flower colour also vary, the latter ranging from yellowish to purplish amongst known forms.

Range, elevation and habitat: *Barbosella prorepens* is a widespread species found in southern Mexico (states of Guerrero, Oaxaca and Veracruz), Guatemala (department of Alta Verapaz), Nicaragua (departments of Granada and Jinotega), Costa Rica (provinces of Alajuela, Cartago, Guanacaste, Heredia, Puntarenas and San José), Panama (province of Chiriquí), Colombia (departments of Cauca, Cundinamarca, Nariño and Tolima), Venezuela (states of Carabobo, Tachira and Yaracuy), Ecuador (provinces of Azuay, El Oro, Loja, Morona-Santiago, Napo, Pichincha, and Zamora-Chinchipe), Peru (department of Amazonas), Bolivia (departments of Cochabamba and Santa Cruz), Hispaniola, Cuba, Jamaica and the Leeward Islands (Guadeloupe) at elevations of 1000–3000 m. This species is frequently encountered and probably occurs in a number of different habitats, including relict trees in pastures, lower wet montane forest, wet montane cloud forest and possibly páramo.

Culture recommendations: *Substrate* mount on tree fern or cork bark, with New Zealand *Sphagnum* moss, or pot using moss or fine bark mix. *Temperature* intermediate to cool. *Light* light shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser in winter.

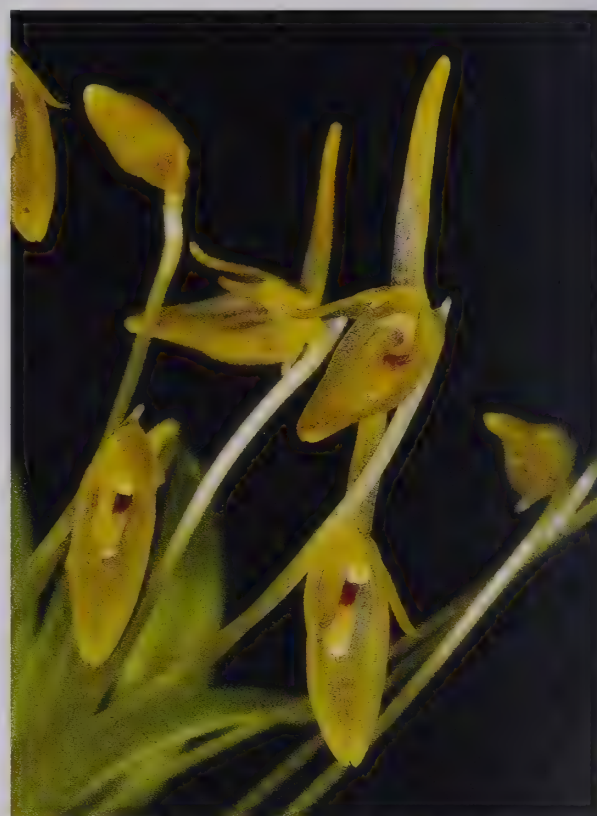


Figure 4.96 (above) Flowers of *Barbosella prorepens* (Grower: Allison Lehman).



Figure 4.97 (above) *Barbosella prorepens* growing in situ in Costa Rica (Photo: Daniel Jimenez).

BARBOSELLA

Comments: Typical of many other species in this genus, *Barbosella prorepens* can easily be grown to specimen size. It is delightful in bloom, with its many, proportionately large flowers held above the attractive foliage. As indicated above, this species is widespread, and thus, variable in size, habit and flower colour. *Barbosella prorepens* is closely related to and may even intergrade with *B. cucullata*. Plants often bloom during the winter in cultivation.



Figure 4.98 (above) Flowers of the related *Barbosella dolichorhiza* in detail (Grower: J & L Orchids).

Bolusiella Schltr.

Publication: Schlechter, F. R. R., 1918, *Beih. Bot. Centralbl.* 36(2): 105

Subfamily: Epidendroideae

Tribe: Vandaeae

Subtribe: Aerangidinae

Type species: *Bolusiella maudiae* (Bolus) Schltr., 1918, *Beih. Bot. Centralbl.* 36(2): 106.

Etymology: Named in honour of Harry Bolus (1834–1911), a Cape Town stockbroker and amateur botanist who described the type species (as an *Angraecum*).

Profile: A genus of 6 species that is widespread in tropical to southern Africa and the Comoros Islands.

General plant morphology: Monopodial, epiphytic, short stems, some branching at base to form clumps, leaves equitant, imbricate, roots fine. *Leaf* fleshy, laterally flattened, arranged in a fan. *Inflorescence* a raceme, axillary. *Flower* very small, few to many, resupinate, sepals and petals sub-equal, lip entire or obscurely three-lobed, spurred at base, spur usually shorter than lip, column short, lacking a foot, rostellum subulate, hooked, pollinia 2.



Figure 4.99 (above) A mounted *Bolusiella maudiae* specimen from material collected in Kenya (Grower: University of California, Berkeley).

BOLUSIELLA

Bolusiella maudiae (Bolus) Schltr.

Publication: *Beih. Bot. Centralbl.* 36(2): 106 (1918)

Etymology: Possibly named in honour of Mrs. Maude Saunders (Zululand, Africa).

Homotypic synonyms: *Angraecum maudiae* Bolus.

Heterotypic synonyms: *Listrostachys imbricata* Rolfe, *Bolusiella imbricata* (Rolfe) Schltr.

Morphology: *Plant* 2–7 cm wide by 4 cm tall, short erect stem to 2 cm, woody, fan shaped, branching from base, leaves 4–10 in number. *Leaf* 1–3.5 cm long by 0.3–0.9 cm wide, elongate-elliptic, sword shaped, apex obtuse, laterally compressed, lamina rigid, fleshy, glossy, rugose with some papillae towards base. *Inflorescence* a dense raceme, often more than 2 simultaneous inflorescences, 2–8 cm long, flowers distichous, with brown, subtending bracts. *Flower* 0.3–0.4 cm in diameter, to 16 in number, simultaneous, not spreading widely, campanulate, spur 0.2 cm long.

Range, elevation and habitat: *Bolusiella maudiae* grows as an epiphyte on twigs and branches of small trees and bushes in warm forest, at elevations of 500–1900 m. It occurs, and can be locally common, in wetlands, high rainfall woodlands, rainforest and riparian forest in Ghana, Ivory Coast, western Kenya, Malawi, South Africa (KwaZulu Natal), Tanzania, Uganda, Zaire, Zambia, and Zimbabwe. Plants typically bloom between June and September in nature.

Culture recommendations: *Substrate* mount on cork or hardwood, possibly potted, but care must be given to provide an open, well-drained medium that does not stay too moist. *Temperature* warm to intermediate. *Light* bright diffused to light shade. *Watering* moist, then dry. Make sure both plant and mount dry out between waterings. *Humidity* high. *Air movement* good. *Propagation* rarely by division, otherwise by seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: Not commonly seen in cultivation, at least in the United States, this species certainly deserves to be more widely grown. The small, attractive, fan-shaped plants with their textured leaves are a lovely sight, particularly with the little white flowers held above or jutting past the leaves. The leaves may wither slightly when the plant is in bloom. Plants in cultivation bloom between spring and summer in the northern hemisphere.



Figure 4.100 (above) *Bolusiella maudiae* plants and flowers (Grower: Jacob Knecht).



Figure 4.101 (above) Flowers of *Bolusiella maudiae* in detail (Grower: Denver Botanical Gardens).

Brachionidium Lindl.

Publication: Lindley, J., 1859, *Fol. Orchid.* 8: 8

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Brachionidium parvifolium* (Lindl.) Lindl., 1859, *Fol. Orchid.* 8: 1.

Etymology: Diminutive of the Greek *brachion* (arm), a reference to the short arms of the stigma and rostellum.

Heterotypic synonyms: *Yolanda* Hoehne.

Profile: A genus of more than 70 species, mostly miniature, found in humid cloud or elfin forest up to 3900 m in Guatemala, Nicaragua, Costa Rica, Panama, Colombia, Ecuador, Peru, Bolivia, Venezuela, Guyana and Brazil, as well as in the Caribbean (Hispaniola, Jamaica, Puerto Rico, Windward and Leeward Islands). Most of the species are local and infrequent, often found in wet forest, whilst some are common on embankments of road cuts, frequently growing among mosses, lichens and leaf litter.

General plant morphology: Sympodial, epiphytic, terrestrial or lithophytic, erect or creeping, sometimes repent, rhizomes sheathed, branching, rooting along stem or at base. *Ramicauls* short, erect, sheathed (usually long pointed, sometimes scurfy or scaly), unifoliate. *Leaf* petiolate, spaced along the rhizome. *Inflorescence* a raceme, erect, terminal. *Flower* single, usually non-resupinate, delicate, cross-shaped, sepals and petals subsimilar, all segments usually acuminate, sepals and petals thin textured, dorsal sepal free, lateral sepals connate to form synsepal, lip small, fleshy, unlobed to trilobed, usually transverse with a central callus, anterior margin of lip varying from entire, fringed or variously callused and hinged to column foot, column short and broad, anther apical, stigma apical, transverse, bilobate, pollinia 6 or 8. Flowers are usually short-lived.

General culture notes: Cultivation is notoriously difficult, but plants should be grown in moist, medium shaded situations. If plants can be obtained, high quality water with low total dissolved salts and weak, regular feeding are recommended.



Figure 4.102 (above) *Brachionidium imperiale* (Photo: Lou Jost).



Figure 4.103 (above) *Brachionidium* sp. (Grower: Brad Cotten).

BRACHIONIDIUM

Brachionidium folsomii Dressler

Publication: *Orquideologia* 15: 154 (1982)

Etymology: Named in honour of Dr. James P. Folsom (1950-), Director of the Huntington Botanical Gardens, San Marino, who discovered the species.

Morphology: Plant to 7 cm tall, occasionally branching, rhizome relatively stout, ascending to erect, straight, 0.2–0.5 cm between ramicauls. *Ramicaul* 0.4–0.7 cm long, erect, enclosed in sheaths. *Leaf* 1.3–3 cm long (including 0.2–0.3 cm petiole) by 0.6–1.1 cm wide, elliptical, apex acute to sub-acute, lamina suberect, leathery. *Inflorescence* a raceme, 2–3 cm long, slender, erect, borne near apex of ramicaul. *Flower* 3–3.5 cm in diameter, single, non-resupinate, spreading widely.

Range, elevation and habitat: *Brachionidium folsomii* occurs in Guatemala (department of Alta Verapaz), Nicaragua (department of Atlántico Norte), Costa Rica (provinces of Alajuela, Guanacaste, and Puntarenas), Panama (provinces of Veraguas and Coclé) and Ecuador. It is often abundant, growing epiphytically on large tree trunks or terrestrially in humus or on disturbed road cuttings at 450–1800 m altitude. It is quite probable that plants bloom sporadically throughout the year. Conservation status unknown.

Culture: *Substrate* mount on tree fern or cork, or in small pots, using New Zealand *Sphagnum* moss in both cases. *Temperature* intermediate. *Light* light shade. *Watering* moist, well-drained, but not wet. *Humidity* high. *Air movement* good. *Propagation* possibly by division and by seed. *Brachionidium folsomii* is prone to bean yellow mosaic virus, which is introduced by aphids. Ensure that plants are kept free of these pests.

Comments: For a time, this species was available from various dealers, though it has not been seen for several years. As suggested in the genus account, *Brachionidium* species are difficult to cultivate in the long term. It has been said that this species survives longer than most of its congeners in cultivation. Plants can bloom in any month of the year.



Figure 4.104 (above) A *Brachionidium folsomii* plant bearing a single, magnificent flower (Grower: Andy's Orchids).



Figure 4.105 (above) *Brachionidium folsomii* blooms of a different clone almost dwarf their pot (Grower and Photo: Ron Griesbeck, courtesy of Yoshi Nomura).

BRACHIONIDIUM

Brachionidium kuhniarum Dressler

Publication: *Orquideologia* 15: 157 (1982)

Etymology: Named for Janet (originally of J & L Orchids, Easton, Connecticut) and Helen Kuhn, who discovered this species.

Morphology: *Plant* to 10 cm tall, rhizome erect, sometimes branching, 0.5–0.8 cm between ramicauls. *Ramicaul* 0.3–0.5 cm, erect, enclosed in sheaths. *Leaf* 0.7–1.5 cm long (including abbreviated petiole) by 0.4–1.1 cm wide, elliptical, apex sub-acute, apiculate, lamina leathery. *Inflorescence* a raceme, peduncle 0.7–1.7 cm long, erect, slender, terete, borne near apex of ramicaul. *Flower* 1.5 cm in diameter, single, non-resupinate, spreading widely, pedicel 0.5 mm long.

Range, elevation and habitat: *Brachionidium kuhniarum* has been found in Panama (north side of El Copé, province of Coclé), growing as a pendent epiphyte on tree trunks in a very wet cloud forest at 750–800 m altitude, and northern Ecuador (province of Napo, eastern side of Volcán El Reventador) at 1850 m. It is likely that this species also occurs in Colombia, though no records have emerged to date. Conservation status unknown.

Culture: *Substrate* mount on tree fern or cork, or in small pots, using New Zealand *Sphagnum* moss in both cases. *Temperature* intermediate. *Light* light shade. *Watering* moist, well-drained, but not wet. *Humidity* high. *Air movement* good. *Propagation* possibly by division and by seed.

Comments: As with *Brachionidium folsomii*, this species was once available to horticulturists for a period of time. Plants are rare in cultivation owing to the difficulty that cultivation of this genus presents.



Figure 4.106 (above) The otherworldly bloom of *Brachionidium kuhniarum*, borne on a relatively short inflorescence above the plant. This cultivar has been awarded a Certificate of Botanical Recognition by the American Orchid Society (Grower: Jay Norris).



Figure 4.107 (above) *Brachionidium Ingramii* plants growing epiphytically in mossy forest, Ecuador (Photo: Andreas Kay).

Figure 4.108 (below) The flower of *Brachionidium Ingramii* in detail, Ecuador (Photo: Andreas Kay).

Bulbophyllum Thouars

Publication: du Petit Thouars, L. M. A., 1822, *Hist. Orchid.*: t. 3, nom. cons.

Subfamily: Epidendroideae

Tribe: Podochileae

Subtribe: Bulbophyllinae

Type species: *Bulbophyllum nutans* (Thouars) Thouars, 1822, *Hist. Orchid.*: t. 107.

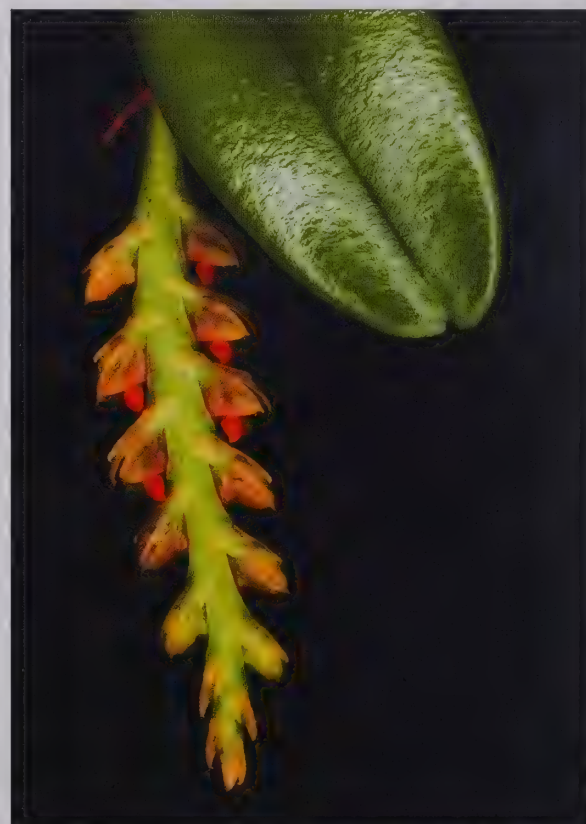
Etymology: From the Greek *bolbos* (bulb) and *phyllon* (leaf), a reference to the leaves, which arise from the pseudobulb.

Heterotypic synonyms: *Phyllorkis* Thouars, *Tribrachia* Lindl., *Anisopetalon* Hook., *Cochlea* Blume, *Cochlia* Blume, *Diphyes* Blume, *Ephippium* Blume, *Epicranthes* Blume, *Osyricera* Blume, *Zygoglossum* Reinw., *Bulbophyllum* Spreng., orth. var., *Gersinia* Néraud *Megaclinium* Lindl., *Odontostylis* Breda nom. illeg., *Sestochilos* Breda, *Epicrianthus* Blume, *Odontostylis* Blume nom. superfl., *Hippoglossum* Breda, *Cirrhopetalum* Lindl. nom. cons., *Lyraea* Lindl., *Macrolepis* A.Rich. *Malachadenia* Lindl., *Pachyrhachis* A.Rich. *Oxysepalum* Wight, *Bulbophyllaria* Rchb.f., *Bulbophyllopsis* Rchb.f., *Didactyle* Lindl., *Xiphizusa* Rchb.f., *Sarcobodium* Beer, *Bulbophyllaria* S.Moore orth. var., *Henosis* Hook.f., *Adelopetalum* Fitzg., *Pelma* Finet, *Codonosiphon* Schltr., *Dactylorhynchus* Schltr., *Monosepalum* Schltr., *Hyalosema* Rolfe, *Canacorchis* Guillaumin, *Cirrhophyllum* auct., *Hapalochilus* (Schltr.) Senghas, *Ferruminaria* Garay, Hamer & Siegerist, *Mastigion* Garay, Hamer & Siegerist, *Rhytionanthos* Garay, Hamer & Siegerist, *Synarmosepalum* Garay, Hamer & Siegerist, *Vesicisepalum* (J.J.Sm.) Garay, Hamer & Siegerist, *Oncophyllum* D.L.Jones & M.A.Clem., *Peltopus* (Schltr.) Szlach. & Marg., *Blepharochilum* M.A.Clem. & D.L.Jones, *Carpamororchis* M.A.Clem. & D.L.Jones, *Fruticicola* (Schltr.) M.A.Clem. & D.L.Jones, *Kaurorchis* D.L.Jones & M.A.Clem., *Papulipetalum* (Schltr.) M.A.Clem. & D.L.Jones, *Serpenticaulis* M.A.Clem. & D.L.Jones, *Spilorchis* D.L.Jones & M.A.Clem., *Hamularia* Aver. & Averyanova, *Hordeanthos* Szlach., *Lepanthanthe* (Schltr.) Szlach., *Trachyrhachis* (Schltr.) Szlach., *Tripudianthes* (Seidenf.) Szlach. & Kras.

Profile: One of the largest orchid genera, with well over 1000 sympodial species that are widely distributed through Asia, Australasia, Africa, and the tropical Americas. This genus has been placed in different tribes, including *Dendrobieae*, by different taxonomists.

General plant morphology: Plant sympodial, very small to very large, epiphytic, occasionally lithophytic. *Pseudobulbs* vary in size and shape, may be set close together or spaced along a rhizome, unifoliate or bifoliate. *Leaf* may be thin textured, leathery or fleshy. *Inflorescence* unbranched, arising from base of pseudobulb. *Flower* one to many, dorsal sepal free, lateral sepals joined to column foot to form mentum, sometimes connate for some or all of their length, petals free, smaller than sepals, lip entire or trilobed, fleshy, often fringed or pubescent, usually hinged to column foot, many species malodorous. Pollinia 4 or 2. This genus is a veritable taxonomic nightmare, with various sections elevated to genus status by some, and subsumed by others. There is even disagreement as to which sections various species belong to. Compounding the difficulties in classification is the sheer number of species involved.



BULBOPHYLLUM***Bulbophyllum acutibracteatum* De Wild.****Publication:** *Pl. Bequaert.* 1: 101 (1921)**Etymology:** From the Latin *acutus* (keen, sharp) and *bracteatum* (with bracts), a reference to the subtending bracts.**Homotypic synonym:** *Bulbophyllum platyrhachis* De Wild., *Miss. Ém. Laurent* 1: 223 (1906), nom. illeg.**Morphology:** *Plant* 5–10 cm tall, creeping, pseudobulbs spaced 1–8 cm apart along branching rhizome. *Pseudobulb* 1–4 cm tall by 0.5–1 cm wide, ovoid or ellipsoid, tetragonal, bifoliate. *Leaf* 1–7 cm long by 0.5–2 cm wide, subpetiolate, elliptic to lanceolate, apex obtuse, emarginate at apex, lamina spreading to suberect, thick, rigid, leathery. *Inflorescence* a raceme, 5–16 cm long, rachis 4 angled in cross section, flowers in two rows on opposite sides, flowers partially enclosed in subtending bracts, borne laterally from base of pseudobulb. *Flower* 0.3–0.4 cm long, few to 50 in number, few to several open at a time, resupinate, barely opening to not spreading widely, campanulate, lip hinged, flowers yellow to orange-red.**Range, elevation and habitat:** *Bulbophyllum acutibracteatum* is a common, widespread, tropical African species, found in Gabon, Libya, Sierra Leone, Zaire, Congo and Zimbabwe, where it grows in the lowlands in wet to seasonally dry forest at elevations up to 1000 m altitude.**Culture recommendations:** *Substrate* mount on cork or rough-barked hardwood, using only a little moss, or pot in an open, well-drained bark mix in pots or baskets. *Temperature* warm to intermediate, probably best kept above 12 °C (55 °F). *Light* bright diffused to light shade. *Watering* moist, then drying briefly before watering again. Some wild populations undergo quite a pronounced dry season, whilst others have moisture for most of the year. *Humidity* high. *Air movement* good. *Propagation* division and seed**Comments:** This petite member of the section *Megaclinium* has somewhat modest flowers; they are small and do not open widely, but they are brightly coloured. Plants in this section are bifoliate, and have an unusual, knife-like rachis with small flowers opening on either side. Interestingly, many species in this section have both small and large forms. *Bulbophyllum acutibracteatum* tends to bloom in the autumn in cultivation.**Figure 4.110 (above)** The modest, but brightly coloured flowers of *Bulbophyllum acutibracteatum* (Grower: Howard Gunn).**Figure 4.111 (above)** Inflorescence and leaf of *Bulbophyllum acutibracteatum* (Grower: University of California, Berkeley).

BULBOPHYLLUM

Bulbophyllum alkmaarense J.J.Sm.

Publication: *Bull. Dép. Agric. Indes Néerl.* 45: 7 (1911)

Etymology: From Alkmaar, a campsite on the Mamberambo River, near Mt. Trikora (formerly Wilhelmina), Papua, Indonesia. The campsite was apparently named after the eponymous town in Noord-Holland province in the western Netherlands.

Homotypic synonyms: *Haplochilus alkmaarensis* (J.J.Sm.) Garay & W.Kitttr.

Heterotypic synonyms: *Bulbophyllum jadunae* Schltr., *Bulbophyllum jensenii* J.J.Sm., *Haplochilus jadunae* (Schltr.) Garay & W.Kitttr., *Haplochilus jensenii* (J.J.Sm.) Garay & W.Kitttr.

Morphology: Plant 2–3 cm tall, creeping, repent, pseudobulbs to 1 cm apart, rhizome sheathed, frequently branching, mat forming. *Pseudobulbs* less than 1 cm tall, globose to ovoid, faintly shallowly ribbed, base of pseudobulb enclosed in pair of imbricate, clasping, reddish brown papery bracts, leaf apical, unifoliate. *Leaf* to 2 cm long by 1 cm wide, sessile to subpetiolate, ovate, apex obtuse, lamina erect to spreading, leathery, rigid, sparsely punctate dorsal surface, new leaves slightly glossy. *Inflorescence* a raceme, very short, erect, slender. *Flower* to 2 cm wide, single, resupinate, lip fleshy, not hinged, bright yellow, almost wet looking. Flowers usually last 1 to rarely 2 days.

Range, elevation and habitat: To date, *Bulbophyllum alkmaarense* has only been found in New Guinea at elevations between 1500–2500 m. It grows in wet, humid, montane forest. Flowering records are unknown, but plants are presumed to bloom throughout the year in nature. Conservation status unknown, but likely to be locally common.

Culture recommendations: *Substrate* best suited to mounting on cork, hardwood or tree fern, using New Zealand *Sphagnum* moss. *Temperature* intermediate to cool, can easily tolerate temperatures down to 10 °C (50 °F). *Light* bright diffused to light shade. *Watering* moist, well-drained, not wet, may be allowed to dry slightly/briefly between waterings without harm. *Humidity* high. *Air movement* good. *Propagation* easily by division, and seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing the strength and frequency during winter.

Comments: The proportionately large flowers are an unusual blackish-maroon colour attractively edged in white, with a bright yellow, wet-looking, forward jutting, immobile lip. This lovely plant has flowers that are larger than the individual growths. A drawback for some growers may be the short-lived nature of the flowers, which last just a single day, occasionally into the second day, but the plant may bloom at any time of the year in cultivation. This species belongs to section *Haplochilus*.

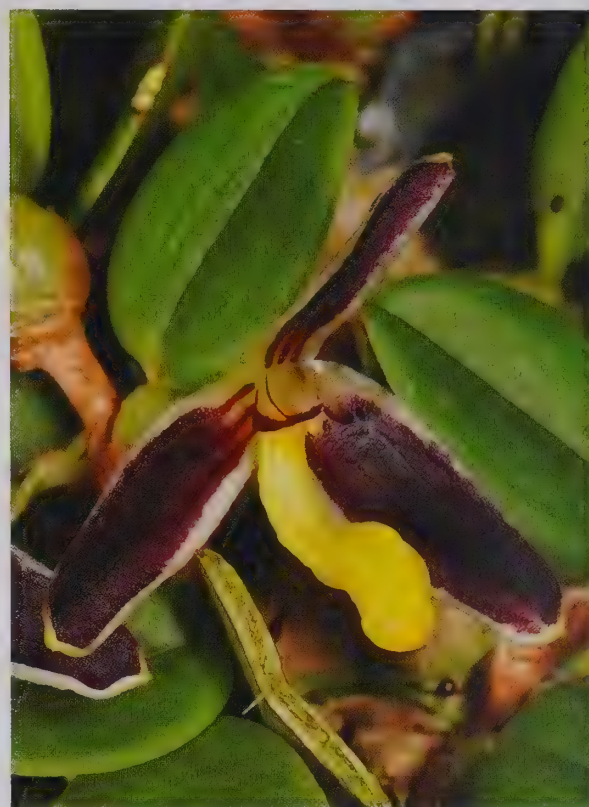


Figure 4.112 (above) The striking bloom of *Bulbophyllum alkmaarense* (Grower: Mary Gerritsen).

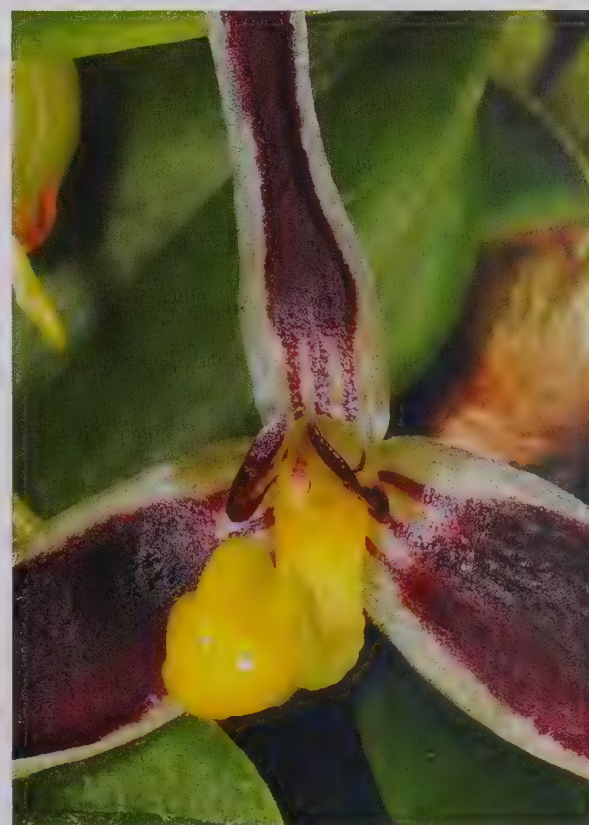


Figure 4.113 (above) Detail of a *Bulbophyllum alkmaarense* bloom (Grower: Mary Gerritsen).

BULBOPHYLLUM

Bulbophyllum appendiculatum (Rolfe) J.J.Sm.

Publication: *Bull. Jard. Bot. Buitenzorg* II 8: 22 (1912)

Etymology: From the Latin *appendiculatum* (with appendages) most likely referring to the fringe of paleae on the petals and dorsal sepal.

Homotypic synonyms: *Cirrhopetalum appendiculatum* Rolfe, *Mastigion appendiculatum* (Rolfe) Garay, Hamer & Siegerist.

Morphology: Plant to 13 cm tall, creeping, branching, pseudobulbs spaced 2–4 cm apart along rhizome. *Pseudobulbs* 2–3.5 cm tall by 1.5 cm wide, multi-angled, ovoid to oblong, sulcate, yellowish green, leaf apical, unifoliate. *Leaf* 7–10 cm long and up to 3 cm wide, sessile, elliptic to oblong to ovate, apex rounded, minutely bilobate, lamina erect, thick, leathery, fleshy, slightly flexible. *Inflorescence* a raceme, to 10 cm long, horizontal to descending, slender, borne laterally from pseudobulb. *Flower* to 20 cm long, 1 or rarely 2 in number, simultaneous, resupinate, lateral sepals connate for nearly entire length, petals and dorsal sepal with fringe of paleae.

Range, elevation and habitat: *Bulbophyllum appendiculatum* was originally collected in what are described as “tropical valleys” in Sikkim. It occurs in deciduous woodlands in hilly country, ranging from India (Eastern Himalayas, Assam) to northern Indochina, where it is locally common. It blooms in October and November in nature.

Culture recommendations: *Substrate* mount on a broad, flat piece of cork bark to accommodate the rambling rhizome, possibly on tree fern using New Zealand *Sphagnum* moss, or pot in a shallow bulb pan or basket using moss or bark mix. Mounting is seen as preferable. *Temperature* warm to intermediate. *Light* light shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.

Comments: This striking species has a very long, narrow flower with a beautiful fringe of sensitive paleae decorating the gracefully posed dorsal sepals and petals. The paleae and musty floral odour function in pollinator attraction. *Bulbophyllum appendiculatum* is easy to grow, common, and readily available, and tends to bloom in cultivation sporadically throughout the year, perhaps more so in autumn to mid-winter. This species has been placed in section *Mastigion* (though the authors regard it is a single-flowered *Cirrhopetalum*). *Bulbophyllum appendiculatum* is a close relative of the larger, more commonly available species *B. putidum* (formerly, *B. fascinator*). This species is often seen in collections misidentified as *B. putidum*. The two species can be easily distinguished by features of the fused lateral sepals; for *B. putidum*, the minutely warty sepals are much broader than the dorsal sepal, whereas the relatively smooth sepals of *B. appendiculatum* are noticeably narrower than the dorsal sepal. Additionally, *B. appendiculatum* has more widely spreading petals and a more rounded lip than *B. putidum*, which has a lip that tends to be more pointed and petals that are more incurved.

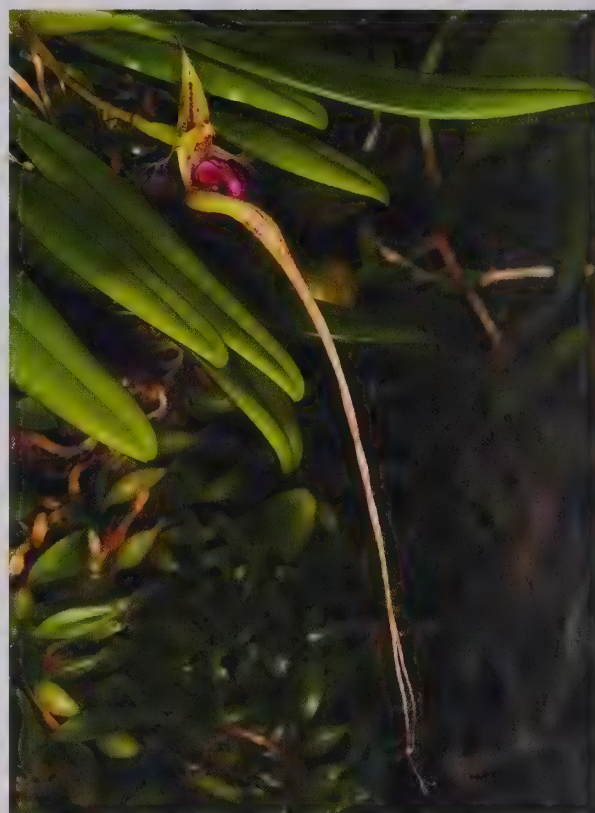


Figure 4.114 (above) The extraordinary flower of *Bulbophyllum appendiculatum* (Grower: Hanging Gardens).

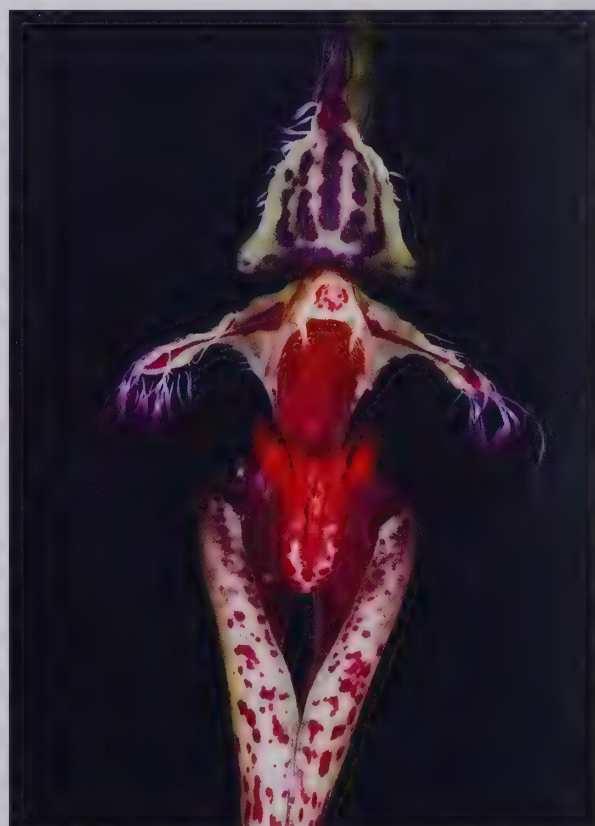


Figure 4.115 (above) *Bulbophyllum appendiculatum* flower in detail (Grower: Lilian Severin).

BULBOPHYLLUM

Bulbophyllum barbigerum Lindl.

Publication: *Edwards's Bot. Reg.* 23: t. 1942 (1837)

Etymology: From the Latin *barbiger* (bearded, having a beard), referring to the obviously hairy looking lip.

Homotypic synonyms: *Phyllorkis barbiger* (Lindl.) Kuntze.

Morphology: Plant to 15 cm tall, slowly creeping, pseudobulbs closely set, to spaced 2–3 cm apart along branching rhizome. *Pseudobulb* to 3.5 cm tall by to 3 cm wide, round to broadly ovoid, laterally compressed, unifoliate. *Leaf* to 11 cm long by 3 cm wide, sessile, folded at base, oblong-elliptic, apex obtuse to rounded, minutely bilobate, lamina erect, leathery, slightly flexible. *Inflorescence* a raceme, 8–20 cm long, with relatively large, rounded, open faced bracts subtending the flowers, flowers distichous, erect to arching. *Flower* to 2 cm tall, few to 14 in number, simultaneous, resupinate, widely spreading, but campanulate at base of segments, extremely sensitive hairs on highly mobile hinged lip, petals minute.

Range, elevation and habitat: A widespread and locally common tropical African species, *Bulbophyllum barbigerum* occurs in the Central African Republic, Republic of Congo, Sierra Leone, Gabon, Libya, Ivory Coast, Ghana, Nigeria, Cameroon and Zaire. It is found growing on tree trunks and in the crowns of trees in mossy evergreen forest or seasonally wet semi-deciduous forest at elevations of 900–2300 m. It blooms from late spring into summer in nature.

Culture recommendations: *Substrate* mount on cork or rough-barked hardwood, possibly tree fern, or pot in an open well-drained bark mix. *Temperature* warm to intermediate, best kept above 15 °C (58 °F). *Light* bright diffuse to light shade. *Watering* moist, then drying briefly. Plants can take short dry periods without difficulty, and should have a short dry rest after pseudobulbs mature. In regions with winters with short day lengths and overcast skies, less frequent watering is advised. *Humidity* high. *Air movement* good. *Propagation* by division and seed.

Comments: Plants of *Bulbophyllum barbigerum*, with their coin-like, yellowish-green pseudobulbs, are very appealing. However, the darkly coloured, rather foul-smelling flowers are truly bizarre. Attached by a minute strap, the lip readily flaps up and down, and its long, fine hairs move wildly in the slightest breeze. This species is readily obtained and easy to grow. It belongs to section *Ptiloglossum*. It often blooms in summer in cultivation, although it has also been seen in bloom in late autumn.



Figure 4.116 (above) The unique, bearded flowers of *Bulbophyllum barbigerum* (Grower: White Oak Orchids).

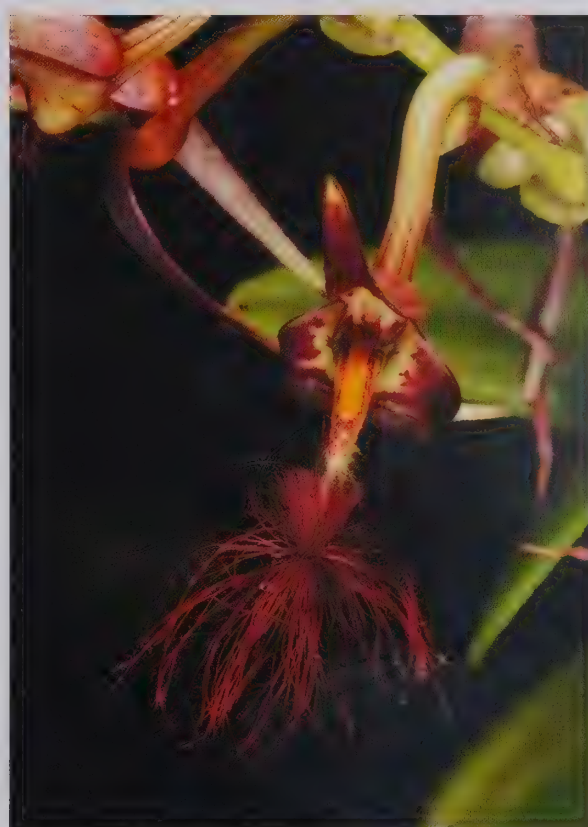


Figure 4.117 (above) A *Bulbophyllum barbigerum* flower in detail. The blooms emit a foetid scent (Grower: Jeff Tyler).

BULBOPHYLLUM

Bulbophyllum bisetum Lindl.

Publication: *Ann. Mag. Nat. Hist.* 10: 186 (1842)

Etymology: From the Latin *bi* (two) and *setum* (bristle) referring to the odd bristles at the base of the dorsal sepal.

Homotypic synonyms: *Bolbophyllaria biseta* (Lindl.) Rchb.f., *Phyllorkis biseta* (Lindl.) Kuntze, *Revis. Gen. Pl.* 2: 677 (1891).

Heterotypic synonym: *Bulbophyllum cirrhopetaloides* Griff.

Morphology: *Plant* 8–14 cm tall, creeping, pseudobulbs spaced 2.5–4 cm apart along branching rhizome. *Pseudobulb* 1.5–2 cm tall by 1.3–1.7 cm wide, conical-ovoid to pyriform, persistent sheaths, unifoliate. *Leaf* 7–12 cm long by 1.4–2 cm wide, sessile to shortly petiolate, narrowly oblong to lanceolate to ovate, apex acute to obtuse, acuminate, lamina arcuate, leathery. *Inflorescence* a densely clustered raceme, congested at apex, rachis 1.2–3.3 cm long, peduncle 3.5–7 cm, descending to pendent, filiform, borne laterally from base of pseudobulb. *Flower* 0.6–0.7 cm long, to 15 in number, simultaneous, resupinate, lip hinged, flowers barely opening.

Range, elevation and habitat: *Bulbophyllum bisetum* occurs in India (Sikkim, Darjeeling Hills, Meghalaya, and Khasia Hills) and north Thailand, at elevations of 1500–2000 m, where it is not uncommon. This species blooms from August–October in nature.

Culture recommendations: *Substrate* due to the pendent nature of the inflorescence, this species is best displayed on cork or hardwood, possibly tree fern, using New Zealand *Sphagnum* moss, or in baskets. It may also be grown potted in a fine, bark-like mix. Care should be taken to ensure that the inflorescences exceed the edge of the pot. *Temperature* intermediate to intermediate-cool. *Light* light shade. *Watering* keep moist and well-drained, not wet, but somewhat drier in winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: This species has a curious, congested head of intricate, softly prickly flowers with the appearance of a raspberry or perhaps a cluster of beetles. This hangs downwards on a thin, lax inflorescence. Uncommon in cultivation, this species blooms in mid-summer.



Figure 4.118 (above) The densely clustered raceme of *Bulbophyllum bisetum* (Grower: Marni Turkel).



Figure 4.119 (above) The inflorescence of *Bulbophyllum bisetum* is lax, hanging straight down (Grower: Marni Turkel).

BULBOPHYLLUM

Bulbophyllum bracteatum F.M. Bailey

Publication: *Dept. Agric. Bot. Div. Bull.* 4: 17 (1891)

Etymology: From the Latin *bractea* (with large or conspicuous bracts), referring to the large bracts along the inflorescence.

Homotypic synonyms: *Adelopetalum bracteatum* Fitzg.

Morphology: *Plant* 2.2–4.2 cm tall, creeping, pseudobulbs closely set, rhizome branching, somewhat mat forming. *Pseudobulb* 0.7–1.2 cm tall by 0.6–0.8 cm wide, conical ovoid, carunculate to deeply ribbed with crenulate ridges and vertical channels, enclosed in a pale sheath, unifoliate. *Leaf* 1.5–3 cm long by 0.7–1 cm wide, short petiolate, ovate to elliptic-oblong, apex obtuse to round, lamina erect to suberect, leathery, rigid. *Inflorescence* a raceme, 5–10 cm long, covered in powdery bloom, with prominent bracts subtending and along peduncle, arching to descending, slender, borne laterally from pseudobulb. *Flower* 0.5–0.8 cm wide, to 25 in number, simultaneous, resupinate, widely spreading, somewhat campanulate, lip hinged. The blotching on the flowers varies in terms of size, colour (dark blackish-purple to brick-red) and density.

Range, elevation and habitat: An endemic eastern Australian species, *Bulbophyllum bracteatum* is locally common around the border of southeastern Queensland and northeast New South Wales, where it grows in the McPherson Range and nearby. This species has also been reported in the Dorrigo Plateau of New South Wales, where it is rare. It is found at elevations of 400–1000 m on large, upper branches of rainforest trees (preferring Hoop Pines, *Araucaria cunninghamii*) on slopes and ridges, and somewhat lower on trees at the rainforest margins. It also grows on exposed rock faces and boulders often near water, and such plants tend to be somewhat larger. *Bulbophyllum bracteatum* usually grows in small clumps, but it can be mat forming in ideal situations. This species is sometimes found growing with *B. minutissimum* on rocks. It blooms in the spring in nature.

Culture recommendations: *Substrate* mount on hardwood, cork bark or tree fern, not well suited to pot culture. *Temperature* intermediate, but in the winter it is cold tolerant for brief periods to near freezing. *Light* bright. *Watering* moist, allowing plants to dry briefly between waterings, and slightly drier during winter. *Humidity* high. *Air movement* good to strong. *Propagation* by division and seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: *Bulbophyllum bracteatum* is a slow growing, easy to cultivate species, and when grown well, can flower prolifically. This species is rarely seen in collections outside of Australia, and it blooms in the spring in cultivation. It has delightful, multicoloured flowers that are offset by the lovely glaucous inflorescence and large floral bracts. *Bulbophyllum bracteatum* is in section *Adelopetalum*.



Figure 4.120 (above) Pendent inflorescences of *Bulbophyllum bracteatum* (Grower: Mike Harrison).



Figure 4.121 (above) Pseudobulbs and leaves of *Bulbophyllum bracteatum* in cultivation (Grower: Ron Parsons).



BULBOPHYLLUM

Bulbophyllum cernuum (Blume) Lindl.

Publication: *Gen. Sp. Orchid. Pl.* 48 (1830)

Etymology: From the Latin *cernuus* (falling headlong, face downwards, nodding), referring to the nodding flower.

Homotypic synonyms: *Diphyes cernua* Blume, *Phyllorkis cernua* (Blume) Kuntze.

Morphology: *Plant* to 8 cm tall, erect, creeping, pseudobulbs spaced 0.8–1.2 cm apart along branching rhizome. *Pseudobulb* 0.8–2 cm tall by 1 cm wide, ovoid, somewhat laterally flattened, unifoliate. *Leaf* 1.5–6 cm long by 0.4–1 cm wide, sessile, narrowly oblanceolate to elliptic, attenuate at base, apex acute, lamina erect to slightly spreading, leathery, rather thick. *Inflorescence* a raceme, 2–7 cm long, peduncle 1–1.5 cm long, slender, suberect, borne laterally from the base of the pseudobulb. *Flower* 2.5 to 4.5 cm wide, single, resupinate, nodding, widely spreading with forward pointing dorsal sepal, petals tiny, lip hinged.

Range, elevation and habitat: *Bulbophyllum cernuum* occurs in Borneo, Thailand, Java, and Sumatra (elevation 610–1850 m). In Java it is quite common, usually found in light forest, but sometimes in quite open situations, and in dry open forest on ridges. Plants in nature bloom from late summer into autumn.

Culture recommendations: *Substrate* mount on cork, rough-barked hardwood or tree fern using New Zealand *Sphagnum* moss, or pot using moss or fine bark mix. *Temperature* warm to intermediate. *Light* light shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* division, seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Bulbophyllum cernuum* is an easy species to grow and fairly easy to obtain. Its bright, slightly nodding flowers are held proud on the inflorescence, giving the species wonderful charisma. This species is in section *Macrocaulia* (it has also been included section *Monilibulbus*), and is related to *B. ovalifolium*. It blooms from mid-summer to mid-autumn in cultivation, and possibly at other times.



Figure 4.122 (facing page) Detail of the blooms of *Bulbophyllum bracteatum* (Grower: Clive Hall).

Figure 4.123 (above) The enchanting and colourful flower of *Bulbophyllum cernuum* (Grower: J & L Orchids).

BULBOPHYLLUM

Bulbophyllum contortisepalum J.J.Sm.

Publication: *Bull. Jard. Bot. Buitenzorg II* 3: 75 (1912)

Etymology: From the Latin *contortus* (twisted) and *sepal* (sepals), referring to the long tails of the lateral sepals which are twisted together.

Heterotypic synonym: *Bulbophyllum streptosepalum* Schltr.

Morphology: *Plant* 3–4 cm tall, creeping, pseudobulbs spaced to 2.2 cm apart along branching rhizome. *Pseudobulb* to 1.5 cm tall by 0.5–0.8 cm wide, conical ovoid, obtuse-tetragonal, unifoliate. *Leaf* 1.5–6 cm long by 1–1.7 cm wide, short petiole, narrow at base, elliptic oblong, to elliptic-ligulate, apex obtuse to rounded, lamina erect to suberect, flat, stiff, leathery, underside rough textured. *Inflorescence* a raceme, 12–17 cm long, arching to erect, filiform, from rhizome or pseudobulb. *Flower* 2.5–7 cm long, single, resupinate, spirally twisted lateral sepals.

Range, elevation and habitat: *Bulbophyllum contortisepalum* is found in the rainforests of New Guinea, the Solomon Islands (Guadalcanal) and Vanuatu (island of Espiritu Santo) at elevations of 0–900 m. It grows on the moss-free trunks and branches of *Casuarina* in moist riparian forest and montane forest, sometimes forming large colonies. No records of bloom-times in nature could be found, but this species is likely to flower at any time of year.

Culture recommendations: *Substrate* mount on cork, hardwood, possibly tree fern, using New Zealand *Sphagnum* moss, or pot using moss or fine bark mix. *Temperature* warm, and if grown with night time temperatures below 15 °C (60 °F), leaf spotting will occur. *Light* light shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* division and seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: The striking flowers of *Bulbophyllum contortisepalum* have an elegant stance, and range in colour from nearly solid cream to bright yellow, to maroon, to blackish, with varying degrees of whitish or yellowish markings and tails. The tails of the lateral sepals have a particular appeal, twisting together and forming an unusual spiral. This species belongs in section Ehippium, though some place it within section Hoplandra. This species flowers between February to August in the northern hemisphere. It is not commonly seen in collections in the United States.



Figure 4.124 (above) A pot of *Bulbophyllum contortisepalum* in flower (Photo: Lian Fu Wang).



Figure 4.125 (above) *Bulbophyllum contortisepalum* from New Britain, Papua New Guinea, cultivated at Leiden Botanical Garden (Photo: Rogier van Vugt).

BULBOPHYLLUM

Bulbophyllum dhaninivatii Seidenf.

Publication: *Felicit. Vol. Southeast Asian Stud.* 1: 154 (1965)

Etymology: Named in honour of H.H. Prince Dhaninivat Bidyalabh Bridhyakon (1885–1974) of Thailand, for his interest in botanical investigation.

Morphology: *Plant* to 9 cm tall, creeping, clustered, pseudobulbs closely set, branching. *Pseudobulb* to 1.8 cm in diameter, subconical to somewhat depressed, multi-angular, surface irregularly furrowed, and variably tubercled, glossy, with basal papery bracts, bifoliate. *Leaf* 7–9 cm long by 2 cm wide, subpetiolate, folded at base, oblong-elliptic, apex acute, slightly spreading, lamina thinly, softly leathery, leaves mature relatively quickly in the wet season and are deciduous by autumn, after which the plant flowers. *Inflorescence* a raceme, to 3 cm long, peduncle very short, 0.3–0.4 cm long, rachis very congested, to 2 cm long, descending to pendent, with subtending bracts borne laterally from the base of the pseudobulb. *Flower* to 0.6 cm in diameter, 10–30 in number, simultaneous, resupinate, somewhat spreading, campanulate, sepals hairy on exterior, lip hinged.

Range, elevation and habitat: *Bulbophyllum dhaninivatii* is endemic to northern Thailand at elevations of 1100–1200 m. It has been found growing as an epiphyte on *Rhododendron lyi* in the province of Loei in an area with a distinct dry period. In nature, it blooms in October after the leaves drop. Conservation status unknown, but as a narrow endemic in a region where poaching occurs, it is likely to be of concern.

Culture recommendations: *Substrate* best mounted on cork using a little New Zealand *Sphagnum* moss, possibly in basket in moss or fine bark mix. Some growers have had great success growing this species on cedar plaques. *Temperature* warm to intermediate while growing, but may take to 4 °C (40 °F) during its winter rest. *Light* bright diffused to light shade. *Watering* moist yet well-drained when in leaf, much drier after leaves fall during its rest period, only misting occasionally to keep from complete desiccation. *Humidity* high while growing, average during rest. *Air movement* good. *Propagation* by division and seed. *Fertilise* at 1/4 to 1/2 strength weekly, greatly reducing or omitting during dormancy.

Comments: Although flowers of this species are small, they are extremely enticing. Borne in tight clusters, the blooms are hairy on the outside and along the edges. *Bulbophyllum dhaninivatii* is uncommon in cultivation, but should be grown more widely for its subtle beauty. This species is deciduous when in bloom, which is in the late autumn to early winter in cultivation. *Bulbophyllum dhaninivatii* is classified to section *Tripudianthes*, though vegetatively it is identical to the species of section *Lemniscata*, which also feature a pair of rubbery, fleshy, leathery, semi-pendent deciduous leaves and occur in the same region.



Figure 4.126 (above) The remarkable inflorescence of *Bulbophyllum dhaninivatii* (Grower: Gerardus Staal).



Figure 4.127 (above) *Bulbophyllum dhaninivatii* photographed in the wild in Thailand (Photo: Kobsukh Kaenratana).

BULBOPHYLLUM

Bulbophyllum elassoglossum Siegerist

Publication: *Amer. Orchid Soc. Bull.* 60: 865 (1991)

Etymology: From the Greek *elassos* (smaller or less) and *glossum* (tongue) referring to the small labellum.

Morphology: *Plant* 5–11.5 cm tall, slowly creeping, pseudobulbs spaced up to 4.5 cm apart along branching rhizome. *Pseudobulb* 3 cm tall by 1.5 cm wide, ovoid, tetragonal, unifoliate. *Leaf* to 8.5 cm long by 2 cm wide, subsessile, folded at base, elliptic to narrowly elliptic to oblong, apex acute to obtuse, lamina flat to arcuate, suberect to slightly spreading, leathery, flexible. *Inflorescence* a raceme, peduncle 11 cm long, erect, thin, borne from the rhizome. *Flower* 3–3.5 cm tall, single, resupinate, not spreading fully, lip hinged, proportionately small, flowers lasting 7 to 10 days, but closing daily by mid-morning. Flowers vary in number, width of segments and size and number of spots.

Range, elevation and habitat: *Bulbophyllum elassoglossum* is endemic to the island of Luzon (province of Nueva Viscaya), Philippines, at elevations of 100–1400 m. An uncommon species, it grows as an epiphyte amongst mosses and ferns on horizontal branches and trunks in humid, shady hill and montane forest. It is not certain when this species blooms in nature.

Culture recommendations: *Substrate* mount on cork with New Zealand *Sphagnum* moss, allowing for the rambling habit of the plant, or in baskets using moss or fine bark mix. *Temperature* warm to intermediate. *Light* bright diffused to light shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: A handsome little species with proportionately large, elegant flowers. This species is in the section *Leptopus*. However, one must rise early to see this plant in bloom; the somewhat short-lived (7–10 days) flowers open early and are often closed by 10:30 am! *Bulbophyllum elassoglossum* blooms in cultivation from spring into mid-summer.

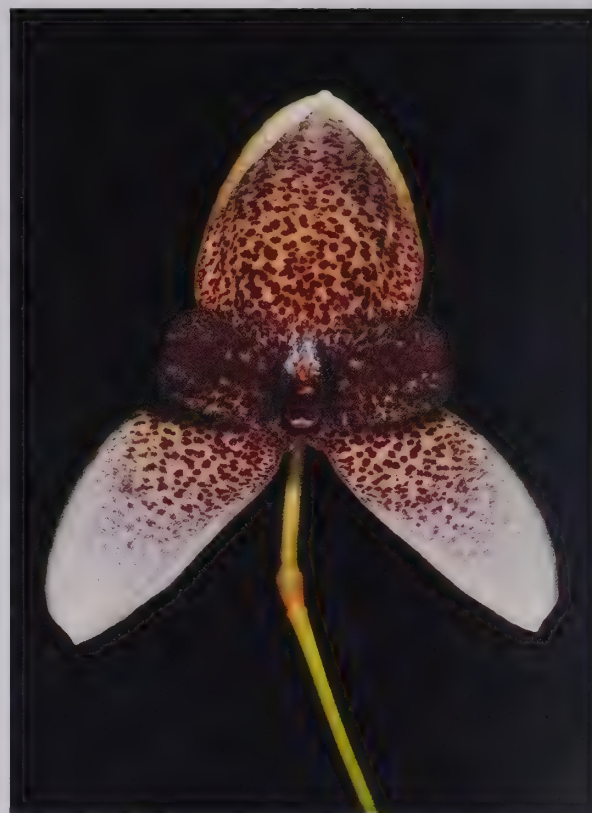


Figure 4.128 (above) The striking flower of *Bulbophyllum elassoglossum* (Grower: Judy Carney).



Figure 4.129 (above) A different *Bulbophyllum elassoglossum* clone (Grower: Mary Gerritsen).

BULBOPHYLLUM

Bulbophyllum elisae (F.Muell.) Benth.

Publication: *Fl. Austral.* 5: 289 (1871)

Etymology: Named after Elisa Kearn, an Australian who collected the species in the 1800s.

Homotypic synonyms: *Cirrhopetalum elisae* F.Muell., *Phyllorkis elisae* (F.Muell.) Kuntze, *Adelopetalum elisae* (F.Muell.) D.L.Jones & M.A.Clem.

Morphology: *Plant* 5–14 cm tall, slowly creeping, pseudobulbs closely set to 2 cm apart along rhizome. *Pseudobulb* 1–3 cm tall by 1.5–2 cm wide, ovoid to conical, covered in somewhat rounded to pointed soft prickles, unifoliate. *Leaf* to 11 cm long by 1.1 cm wide, short but strongly conduplicate petiole, linear to oblong, apex acute to obtuse, lamina erect to slightly spreading, thinly leathery, semi-flexible. *Inflorescence* a raceme, 8–25 cm long, flowers secund, each with a small subtending bract, suberect to descending, slender, borne laterally from base of pseudobulb. *Flower* 1.5–2.5 cm tall or wide, to 12 in number, simultaneous, resupinate, spreading widely, but with small hooded dorsal sepal, lip hinged. Flowers vary in terms of lateral sepal length, and in colour range, which includes green, brown and purplish red, rarely with maroon venation.

Range, elevation and habitat: *Bulbophyllum elisae* is an eastern Australian endemic that is widespread and locally common in montane areas. It ranges from central-eastern New South Wales to southern Queensland at elevations of 400–1300 m (usually above 600 m). It is found in various habitats, including subtropical to warm temperate rainforest, lower montane and montane forest and wet sclerophyllous forest, where it grows on moist moss and lichen covered tree branches and trunks, as well as on bare boulders, rocks and cliff faces. *Bulbophyllum elisae* is found in protected, cool, humid environments where it can form large clumps, but it is also found in more exposed situations. It is often found growing with *B. exiguum*, *B. shepherdii*, *Dendrobium schoeninum* (*Dockrillia schoenina*), *D. speciosum*, various *Sarcophilus* species, and a number of other epiphytic orchid species. In nature it blooms throughout the spring depending on the habitat.

Culture recommendations: *Substrate* grow mounted, preferably on horizontal rafts of cork or rough-barked hardwood using a little New Zealand *Sphagnum* moss. Not well suited to potted culture. *Temperature* warm to intermediate days, cooler nights, may tolerate temperatures near to freezing for brief periods during the winter. *Light* bright diffused, but may do well in light shade. *Watering* frequently, moist, but drying out briefly between waterings, well-drained. Do not keep wet. *Humidity* high. *Air movement* good to brisk. *Propagation* division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: Called the “Pineapple Orchid” by some, *Bulbophyllum elisae* has a reputation of being somewhat difficult to cultivate, even in its native country of Australia. However, this species, in section *Adelopetalum*, is well



Figure 4.130 (above) *Bulbophyllum elisae* growing in situ in New South Wales, Australia.

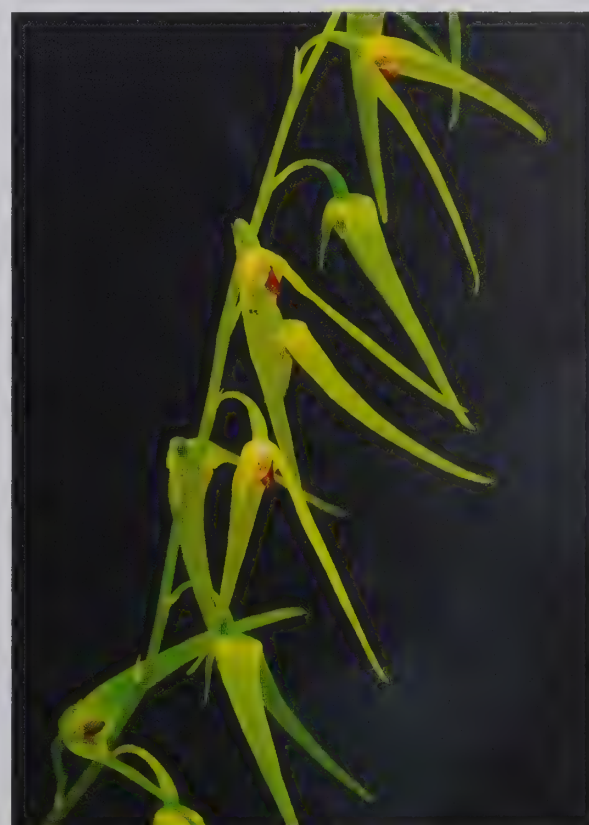


Figure 4.131 (above) Numerous *Bulbophyllum elisae* blooms, seen here in cultivation (Photo: Eric Hunt).



Figure 4.132 (above) An attractive, yellow-flowered variant of *Bulbophyllum elisae* (Grower: Mike Harrison).

Figure 4.133 (below) An elegant green-flowered variant of *Bulbophyllum elisae* (Grower: Mike Harrison).

BULBOPHYLLUM

worth the trouble. This eye-catching, desirable species has amazing bumpy-prickly pseudobulbs, and when in bloom, the inflorescence has the appearance of a row of tiny boomerangs dangling from a string. The flowers are surprisingly variable in colour, shape and size. *Bulbophyllum elisae* blooms in spring to early summer in cultivation.



Figure 4.134 (above) Plants of *Bulbophyllum elisae* growing epiphytically with *B. exiguum* amongst lichen on the trunk of a small tree in New South Wales, Australia.

BULBOPHYLLUM

Bulbophyllum frostii Summerh.

Publication: *Bull. Misc. Inform. Kew* 76 (1928)

Etymology: Named in honour of John Frost (1803–1840), founder of the Medico-Botanical Society (UK), who discovered this species.

Homotypic synonyms: *Cirrhopetalum frostii* (Summerh.) Garay, Hamer & Siegerist.

Heterotypic synonyms: *Cirrhopetalum bootanoides* Guillaumin, *Bulbophyllum bootanoides* (Guillaumin) Seidenf.

Morphology: *Plant* to 8 cm tall, densely clumping, creeping, pseudobulbs spaced to 3 cm apart along branching rhizome. *Pseudobulb* 2 cm tall, conical, multi-angled, olive green, with dried basal sheaths. *Leaf* to 6.5 cm long by 2.5 cm wide, short petiolate to sessile, slightly arcuate, broadly oblong-elliptic to ovate, apex obtuse, sometimes bilobate, lamina suberect to spreading, fleshy, leathery, rigid, minutely rugose, dark blue green. *Inflorescence* umbellate raceme, to 3.5 cm long, usually borne horizontally from base of pseudobulb. *Flower* 2.5–3 cm tall, 2–6 in number, simultaneous, lateral sepals connate for length forming synsepal, dorsal sepals and petals not spreading widely, lip hinged. Flowers vary in size, number and density of spotting (spots may coalesce into larger blotches). Background colour yellowish, green, pinkish to reddish, lip from red to blackish purple.

Range, elevation and habitat: *Bulbophyllum frostii* is found in south central Vietnam (1500 m), Thailand and Peninsular Malaysia in semi-deciduous forest, high in the canopy, often in full sun. In nature, the bulbs and leaves may be a deep purple. It is often found growing with *Panisea albiflora*. It experiences a pronounced rainy season (August to November) with scattered rain the rest of the year. In nature this species blooms from November to January.

Culture recommendations: *Substrate* mount on cork with New Zealand *Sphagnum* moss to allow for spreading of the rhizome, or pot in shallow bulb pan or basket using moss or fine bark mix. *Temperature* intermediate, but cooler in the winter to 10 °C (50 °F). *Light* bright diffuse. *Watering* moist, but allow to dry briefly between waterings. Reduce watering during the winter months. *Humidity* high. *Air movement* good to brisk. *Propagation* division or seed.

Comments: Known by the common name of the “Dutchman’s Clog”, this nickname captures the gestalt of this must-have species. The lovely bi-coloured plant has beautiful, dark blue-green leaves and olive-green pseudobulbs. Also attractive are the cheeky little flowers that are surprisingly variable in the degree and pattern of spotting. When first imported into the United States, the species was sold in error as *Bulbophyllum bootanoides*. This species, in section *Cirrhopetalum*, tends to flower in cultivation from mid-spring to mid-summer, but it has also been seen to bloom in the autumn.



Figure 4.135 (above) The curiously attractive blooms of *Bulbophyllum frostii* (Grower: White Oak Orchids).



Figure 4.136 (above) A light coloured form of *Bulbophyllum frostii* (Grower: Marni Turkel).



Figure 4.137 (above) The unusual shape of *Bulbophyllum frostii* flowers accounts for the common name, “Dutchman’s Clog” (Grower: Marni Turkel).
Figure 4.138 (below) A darker flowering cultivar of *Bulbophyllum frostii* (Grower: Marni Turkel).

BULBOPHYLLUM

Bulbophyllum globuliforme Nicholls

Publication: *Orchidol. Zeylanica* 5: 124 (1938)

Etymology: From the Latin *globus* (globe) and *formis* (form), referring to the appearance of the pseudobulbs.

Homotypic synonym: *Oncophyllum globuliforme* (Nicholls) D.L.Jones & M.A.Clem.

Morphology: *Plant* 2–3.5 mm tall, slowly creeping, sometimes forming dense clumps, pseudobulbs closely set, growing in rows, much branched, mat-forming. *Pseudobulbs* 1.2 mm in diameter, globose, unifoliate. *Leaf* 1–2 mm long by 1–1.5 mm wide, sessile, shape, apex acute, scale like, deciduous. *Inflorescence* a raceme, 1–1.5 cm peduncle, erect, narrow, slender, somewhat hairy or verrucose. *Flower* 3–4 mm tall, single, resupinate, lip hinged, ovary papillose, flowers white to pale cream.

Range, elevation and habitat: *Bulbophyllum globuliforme* is an endemic eastern Australian species with a fairly restricted range, found in the McPherson range (eastern Queensland and New South Wales border) and Calliope range (Queensland) at elevations of 100–900 m. It grows as an epiphyte on the upper branches and trunk of mature Hoop Pines (*Araucaria cunninghamii*). It is rarely found, probably due to its small size, but is locally common. When found, it is usually on a fallen tree or branch, and often in the company of *B. weinthalii* and *B. argyropus*. It blooms in mid-late spring in nature

Culture recommendations: *Substrate* mount vertically on hardwood or cork (not on tree fern) using only a little, if any, New Zealand *Sphagnum* moss. Not suited to potted culture. *Temperature* intermediate, but can take cooler temperatures in the spring and fall, and to near freezing for short periods in the winter. *Light* bright diffused, but ensure that humidity is high so that the tiny plants do not become desiccated. *Watering* moist to dry. Water somewhat frequently, but allow plants to dry out briefly between waterings. Do not allow to stay wet for long periods. *Humidity* high. *Air movement* good to brisk. *Propagation* division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: *Bulbophyllum globuliforme*, one of the smallest of all *Bulbophyllum* and, in fact, of all orchids, is unfortunately rarely seen in cultivation outside of Australia. Though tiny, the charming, single flowered inflorescences are held elegantly above the plant, and the species is rather lovely when in mass bloom. The cute round bulbs resemble the heads of tiny push pins, and the leaf is barely present, falling off shortly after appearing. It is hoped that this appealing little species will become more widespread in cultivation! *Bulbophyllum globuliforme* belongs in section Minutissima.



Figure 4.139 (above) *Bulbophyllum globuliforme* pseudobulbs and flowers (Grower: David P. Banks).



Figure 4.140 (above) Plants of *Bulbophyllum globuliforme* are exceptionally small (Grower: Mike Harrison).

BULBOPHYLLUM

Bulbophyllum intersitum J.J.Verm.

Publication: *Orchid Monogr.* 7: 161 (1993)

Etymology: From the Latin *inter* (between) and *situm* (position), referring to the intermediate characteristics of this species between two closely related *Bulbophyllum* species.

Homotypic synonym: *Peltopus intersitus* (J.J.Verm.) Szlach. & Marg.

Morphology: *Plant* 1–5 cm tall, creeping, frequently branching, mat forming, pseudobulbs closely set to repent. *Pseudobulb* to 1 cm tall, ovoid to oblong, ribbed shallowly but distinctly, unifoliate (rarely bifoliate) *Leaf* 2.5 cm long by 0.7 cm wide, short petiolate, oblong to ovate, apex acute to obtuse, apiculate, lamina slightly arcuate, erect to suberect, fleshy, thinly to thickly leathery, flexible. *Inflorescence* a raceme, peduncle 4.5–8 cm long, erect, filiform, borne laterally from the base of the pseudobulb. *Flower* 1.5–4 cm tall, single, resupinate, widely spreading, prominent sepals tapering into tails, petals and lip proportionately small, petals hooded, forward pointing, lip hinged. Flower varies in background colour from yellowish green to pinkish white, width and intensity of colour of stripes, from semi-campanulate to slightly reflexed at base, and the lip margin from ciliate to fimbriate.

Range, elevation and habitat: *Bulbophyllum intersitum* is endemic to New Guinea at elevations of 1000–3300 m where it grows as an epiphyte in primary, wet evergreen cloud and rainforest. It is quite likely that this species can flower at any time of year in nature. Conservation status unknown, but this species is likely to be locally common.

Culture recommendations: *Substrate* mount on cork or rough-barked hardwood, probably tree fern, usually New Zealand *Sphagnum* moss, not well suited to potted culture, but a small, shallow pot or possibly a basket lined with moss might suffice. *Temperature* intermediate to cool. *Light* light shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* easily by division or seed. Fertilise at 1/4 strength weekly.

Comments: It is quite likely that there is more than one species involved among the florally and vegetatively variable group of plants classified as *Bulbophyllum intersitum*, of section *Peltopus*. The delightful flowers have a surprising resemblance to those of a small *Masdevallia* and can appear often and at any time, making this a desirable species for the collector of miniatures. The plants grow somewhat rapidly and branch freely, allowing easy propagation by division.

Note added in proof: The name of this species has changed. The currently accepted name is *Bulbophyllum triaristella* Schltr.



Figure 4.141 (above) Flowers of *Bulbophyllum intersitum*, a New Guinea endemic (Grower: John Leathers).



Figure 4.142 (above) *Bulbophyllum intersitum* flower of a different cultivar (Grower: Mary Gerritsen).

BULBOPHYLLUM

Bulbophyllum lasiochilum E.C.Parish & Rchb.f.

Publication: *Trans. Linn. Soc. London* 30: 153 (1874)

Etymology: From the Greek *lasio* (woolly, shaggy, velvety) and *cheilos* (lip) referring to the hairy lip.

Homotypic synonym: *Phyllorkis lasiochila* (E.C.Parish & Rchb.f.) Kuntze.

Heterotypic synonyms: *Cirrhopetalum lasiochilum* E.C.Parish & Rchb.f., *Cirrhopetalum breviscapum* Rolfe, *Bulbophyllum breviscapum* (Rolfe) Ridl.

Morphology: Plant 6–13 cm tall, creeping, pseudobulbs to 5 cm apart along branching rhizome. *Pseudobulb* to 2 cm tall by 1.5 cm wide, orbicular to oblong, squat, many angled with subtle ridges, yellowish green, unifoliate. *Leaf* 5–11 cm long by up to 3 cm wide, subsessile to short-petiolate, oblong to ovate, apex obtuse to rounded, bilobate at apex, lamina flat to slightly arcuate, erect, leathery, fleshy, rigid, faintly rugose, marginate, underside paler, greyish-green. *Inflorescence* a raceme, 4–7 cm, erect to suberect, slender. *Flower* 2.5–4 cm tall, single, resupinate, widely spreading, dorsal sepal hooded, lateral sepals not unfolding fully, lip hinged, with long purple hairs on edges. The lateral sepals range from parallel in posture to touching at the apices. The flowers vary in background colour from pinkish to creamy, and from spotted to small blotched, the petals and dorsal sepal vary from dark reddish brown to blackish red, and unspotted, to ochre with reddish spots, and the lip varies from red to yellowish.

Range, elevation and habitat: Locally common, *Bulbophyllum lasiochilum* is found in Myanmar, Thailand, Malaysia and India, where it grows in moist, montane forest as well as in seasonally dry forest. The typical elevation range is undocumented. In Thailand the species blooms in November–December, but possibly at other times of the year as well.

Culture recommendations: *Substrate* mount on a flat piece of cork with some New Zealand *Sphagnum* moss to allow for spreading of the plant, or in a basket using moss or a fine bark mix. *Temperature* intermediate. This species has been grown outside with no winter heat in Sydney, Australia. *Light* light shade. *Watering* moist, well-drained, not wet. It is quite probable that this species can tolerate short periods of dryness. *Humidity* high. *Air movement* good. *Propagation* easily by division, or seed. *Fertilise* at 1/2 strength weekly.

Comments: An easy to grow and rather charming miniature species, *Bulbophyllum lasiochilum* is often seen in cultivation under the synonym *B. breviscapum*. It can bloom almost every month of the year in cultivation, and occurs in a variety of colour forms. In the United States, the most common forms have flowers with either yellowish or darkish maroon segments. This endearing species has much to offer; an upright inflorescence, perky, widely spreading flowers, and a delightful, fuzzy little lip. This species belongs within section *Umbellatae*, a section that is sometimes included in *Sestochilus*, with which it tends to share common characteristics.



Figure 4.143 (above) The *Bulbophyllum lasiochilum* plant (Grower: Mary Gerritsen).



Figure 4.144 (above) The *Bulbophyllum lasiochilum* plant (Grower: Orchids and Gardens).

BULBOPHYLLUM

Bulbophyllum lemniscatoides Rolfe

Publication: *Gard. Chron.* III 672 (1890)

Etymology: From the Greek *lemniskus* (ribbon) and the Greek suffix *-oides* (resemble, looking like), referring to the resemblance of this species to *Bulbophyllum lemniscatum*.

Homotypic synonym: *Hordeanthos lemniscatoides* (Rolfe) Szlach.

Morphology: Plant to 15 cm tall, occasionally larger in cultivation, creeping, pseudobulbs closely set to 2 cm apart along branching rhizome. *Pseudobulb* 1.5–3 cm tall by 2 cm wide ovoid, somewhat flattened, shiny when new, few to several angles, shrivelled with longitudinal furrows when in active growth, bifoliate. *Leaf* 8–12 cm long by 0.5–1.5 cm wide, minutely petiolate to sessile, linear-lanceolate to elongate-oblong, apex obtuse, lamina suberect, softly leathery, fleshy, borne during wet season, deciduous when blooming in dry season. *Inflorescence* a raceme, flowers congested at apex of long inflorescence, rachis pendent, to 3 (rarely 5) cm, peduncle erect, glaucous, flowers subtended by small, narrow, papery bracts, to 25–30 cm long from base of pseudobulb. *Flower* 2 cm (including the pendent paleae up to 1.7 cm long), many (circa 20–30) in number, simultaneous, resupinate, globular, barely opening, campanulate, nodding, sepals bristly, petal margins fringed, lip proportionately large, hinged, paleae terete, rugose, not laminate, tapering at base, rounded at apex.

Range, elevation and habitat: A widespread, but uncommon species, *Bulbophyllum lemniscatoides* occurs in Peninsular Malaysia, southern Thailand, Vietnam, Laos, Sumatra, Java, Borneo and the Philippines (Negros Island) at elevations of 300–1670 m. It grows as an epiphyte on tree trunks in open situations in deciduous forest, savannah-like woods and montane forest. This species generally blooms after the leaves drop in autumn and winter.

Culture recommendations: *Substrate* best mounted on cork bark using a little New Zealand *Sphagnum* moss, possibly in a basket in moss or fine bark mix. Some growers have had great success growing this species on cedar plaques. *Temperature* warm to intermediate whilst growing, but tolerates lows of 4.5 °C (40 °F) during its winter rest. *Light* bright diffused to light shade. *Watering* moist yet well-drained when in leaf, much drier after leaves fall during its rest period, misting roots only very occasionally to prevent excessive desiccation. *Humidity* high while growing, average during rest. *Air movement* good. *Propagation* by division and seed. *Fertilise* at 1/4 to 1/2 strength weekly, omit during dormancy.

Comments: A bizarre little species, *Bulbophyllum lemniscatoides* is definitely an item for a lover of oddities. The minute flowers hang downwards from the upright inflorescence, each bearing long, wispy, terete, tail like appendages (paleae) that flutter in the slightest breeze. The movements and appearance of the paleae are thought to attract pollinators. To succeed with this species,



Figure 4.145 (above) The striking inflorescence of *Bulbophyllum lemniscatoides* (Grower: White Oak Orchids).



Figure 4.146 (above) The related *Bulbophyllum lemniscatum* is similar, but nonetheless distinct (Grower: Howard Gunn).

BULBOPHYLLUM

all aspects of its culture, which are unusual for a *Bulbophyllum*, must be strictly followed. *Bulbophyllum lemniscatum* is a closely related species from Myanmar, Thailand and India (elevation ~400 m). It is most easily distinguished by its paleae, which are shorter, laminate, and hexagonal in cross section. Both species belong in section *Lemniscata*, though some botanists include the species from this small section in *Pleiophyllum*. *Bulbophyllum lemniscatoides* usually blooms in late winter into mid-spring in cultivation, but it may also bloom in early autumn.



Figure 4.147 (above) Flowers of *Bulbophyllum lemniscatoides* exhibiting the long paleae for which this species is known (Grower: Purificacion Orchids).

BULBOPHYLLUM***Bulbophyllum longilabre* Schltr.****Publication:** *Repert. Spec. Nov. Regni Veg. Beih.* 1: 714 (1912)**Etymology:** From the Latin *longe* (long) and *labrum* (lip, edge, rim), referring to the very elongated labellum, which can be up to 3.5 cm long.**Homotypic synonym:** *Hapalochilus longilabris* (Schltr.) Garay & W.Kittr.**Morphology:** *Plant* 2–5 cm tall, slowly creeping, pseudobulbs clustered, branching freely, sometimes slightly mounding. *Pseudobulbs* to 1 cm tall by 0.5 cm wide, conical-ovoid to subglobose, ribbed, purplish in high light, leaf apical, unifoliate. *Leaf* to 3 cm long by 0.5 cm wide, short petiolate, oblong-elliptic, apex acute to obtuse to rounded, sometimes apiculate, apex minutely dentate, lamina erect to spreading, flat to slightly arcuate, fleshy, rugulose, dark green, underside greyish green, densely punctate. *Inflorescence* a raceme, 2–4 cm long, erect to suberect (including pedicel), filiform, borne laterally from pseudobulb. *Flower* 3–3.5 cm long, single, resupinate, spreading widely, sepals somewhat recurved to strongly recurved, petals proportionately small, lip juts forward, large (to 3.5 cm), immobile, column slightly curved downwards.**Range, elevation and habitat:** *Bulbophyllum longilabre* occurs in New Guinea at elevations of approximately 700 m, where it grows in moist to wet, mossy, montane forest. This species probably blooms throughout the year. Conservation status unknown.**Culture recommendations:** *Substrate* mount on cork or rough-barked hardwood, possibly tree fern, using New Zealand *Sphagnum* moss, or pot using moss or fine bark mix. *Temperature* warm to intermediate. *Light* bright diffuse to light shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* division or seed. *Fertilise* at 1/4 strength weekly.**Comments:** This marvellous little species has an amazing, immobile lip nearly as long as the flower is wide, and jutting straight forward. The flowers seem to emerge without warning, and open within a few days of making their first appearance. Unfortunately, the flowers are short-lived, lasting just one or two days (rarely 3). *Bulbophyllum longilabre* is easy to grow under the right conditions and tends to bloom in any month, but more so in the winter. This species belongs in section *Hapalochilus* (considered a separate genus by some authorities).**Figure 4.148 (above)** Mounted *Bulbophyllum longilabre* plants in flower (Grower: Ron Parsons).**Figure 4.149 (above)** *Bulbophyllum longilabre* flower detail (Grower: Ron Parsons).

BULBOPHYLLUM

Bulbophyllum macphersonii Rupp

Publication: *Victorian Naturalist* 51: 81 (1934)

Etymology: Named in honour of John Alexander Macpherson of Victoria Australia, who collected the species.

Homotypic synonyms: *Bulbophyllum purpurascens* F.M.Bailey, *Osyricera purpurascens* H.Deane ex Fitzg., *Blepharochilum macphersonii* M.A.Clem. & D.L.Jones, *Diphyes purpurascens* Szlach. & Rutk.

Morphology: Plant 0.6–2.5 cm tall, creeping, forms dense clumps, growths closely set, branching, mat-forming. *Pseudobulbs* 0.1–0.2 cm tall by 0.1 cm wide, almost globular, somewhat compressed, unifoliate. *Leaf* to 2.5 cm long by 0.2–0.4 cm wide, shortly petiolate, elliptic-oblong to narrowly elliptic, apex acute, lamina erect, thick, fleshy, deeply channelled on upper side, dark green, punctate. *Inflorescence* a raceme, peduncle 1.5–4 cm long, erect, wiry, borne laterally from pseudobulb. *Flower* 0.8–1.2 cm tall, single, non-resupinate, widely spreading, lip linear, hinged. Flowers are usually dark red, but rarely pink, white or green. The flowers are relatively short-lived. *Bulbophyllum macphersonii* var. *spathulatum* differs from the nominate form in that it has a spathulate (spoon shaped) lip and longer, larger segments, erect to suberect and longer leaves, a longer peduncle, and a tendency to be more clumping. This form was known as *B. sladeanum* until relatively recently.

Range, elevation and habitat: *Bulbophyllum macphersonii* is endemic to northeast Australia, where it is found in Queensland. It is widespread and common at elevations of 500–1400 m. It grows on the trunks and branches of rainforest trees, in wet sclerophyllous forest, and on rocks and cliff faces in sheltered areas of open forest. The nominate form is an autumn bloomer, whereas var. *spathulatum* blooms sporadically throughout the year and is often found on the smaller branches of rainforest trees.

Culture recommendations: *Substrate* mount vertically or horizontally on cork or rough-barked hardwood using New Zealand *Sphagnum* moss, or pot using moss. *Temperature* intermediate to cool, can take much cooler temperatures during the winter, but it is best kept above 10 °C (50 °F). *Light* bright diffused. *Watering* moist, well-drained, allow to dry briefly between waterings. *Humidity* high. *Air movement* good. *Propagation* division or seed. *Fertilise* at 1/4 strength weekly.

Comments: The ordinarily garnet coloured flowers of this uncommon species are held above the attractive, succulent foliage. Atypically for a *Bulbophyllum*, *B. macphersonii* has proportionately large, pleurothallid-like flowers with a loosely hinged lip that moves freely, flitting about in the slightest breeze. This species, rarely seen outside of Australia, belongs in section Polyblepharon, although Clements & Jones place it in the genus *Blepharochilum*. Plants tend to bloom from mid-summer to mid-autumn; flowers are relatively short-lived, lasting 5–7 days. *Bulbophyllum macphersonii* var. *spathulatum* is the form most commonly seen in the United States.



Figure 4.150 (above) *Bulbophyllum macphersonii* var. *spathulatum* (Grower: Mike Harrison).



Figure 4.151 (above) *Bulbophyllum macphersonii* plants (Grower and Photo: Mikael Karlbom).

BULBOPHYLLUM

Bulbophyllum maquilingense Ames & Quisumb.

Publication: *Philipp. J. Sci.* 47: 208 (1932)

Etymology: From Mt. Makiling, a 1090 m high volcano in Laguna province on the island of Luzon, the Philippines.

Morphology: *Plant* 6–9 cm tall, creeping, pseudobulbs crowded to 5 mm apart along branching rhizome. *Pseudobulb* 1.8 cm tall by 1 cm wide, ovoid to ovoid-conical, sub-tetragonal, bracts at base, smooth or grooved, unifoliate. *Leaf* to 7 cm long by 1 cm wide borne on a short petiole to 3 mm long, folded at base, elliptic to elliptic-oblong to narrowly oblong, apex acute, minutely apiculate, lamina erect to suberect, leathery, flexible. *Inflorescence* a raceme, peduncle 3.5 cm long, up to 8 generally successive inflorescences per pseudobulb, erect to suberect, filiform, lateral from base of pseudobulb. *Flower* 1.5–1.8 cm tall, single, resupinate, widely spreading, large dorsal sepal deeply concave forming hood, lateral sepals tapering to points, distinctly reflexed at base, lip hinged. The background colour of the flowers varies in background colour from yellow to light pinkish, with a range of red to reddish-brown overlay, from small spots, sometimes stripes, to large blotches.

Range, elevation and habitat: An uncommon endemic of the Philippines, *Bulbophyllum maquilingense* is known only from a few localities in Luzon (provinces of Aurora, Cagayan, Laguna, Nueva Viscaya and Quezon), Sibuyan and Mindanao (province of Bukidnon), where it occurs at elevations of 800–1000 m. It grows as an epiphyte on small trees and shrubs, usually at the base, in moist montane forest. It is likely that plants bloom at any time of year in nature.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern, using new Zealand *Sphagnum* moss, or pot using moss or fine bark mix. *Temperature* intermediate. *Light* light shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* division or seed. *Fertilise* at 1/4 strength weekly.

Comments: The swept-back lateral sepals and hooded dorsal sepal lend the flowers of this charming species the appearance of a strange bird in flight. Moreover, the flowers seem to come in a vast array of colours, suffusions and patterns. Another attractive trait is the blooming habit; each pseudobulb can bloom many times over several years. This species can bloom in any month in cultivation. *Bulbophyllum maquilingense* belongs in section *Leptopus*.



Figure 4.152 (above) A yellow *Bulbophyllum maquilingense* flower (Grower: Marni Turkel).

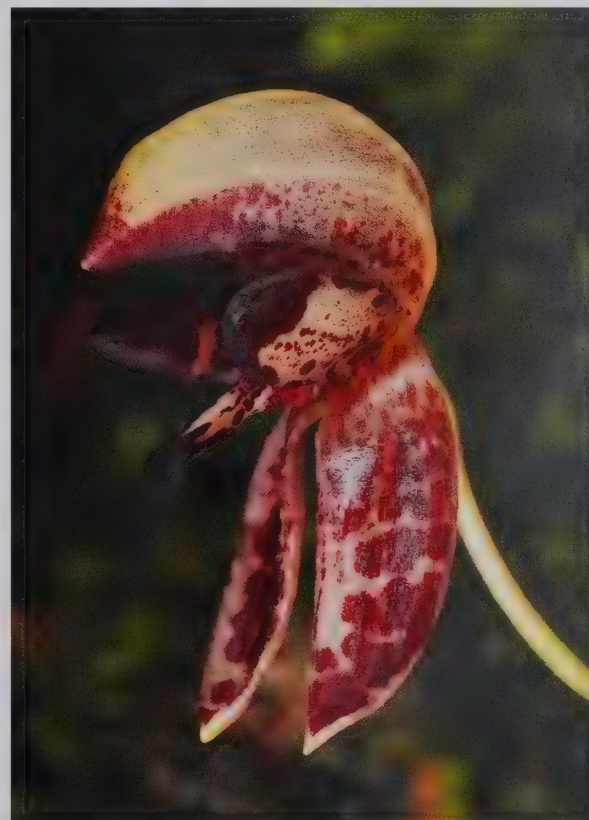


Figure 4.153 (above) *Bulbophyllum maquilingense* pinkish variant with large blotches (Grower: Jon Wagner).

BULBOPHYLLUM

Bulbophyllum minutissimum (F.Muell.) F.Muell.

Publication: *Fragm.* 11: 53 (1878)

Etymology: From the Latin *minutus* (small, pretty) and *-issimum* (Latin suffix added to adjectives to form a superlative), referring to the very small plant size.

Homotypic synonyms: *Dendrobium minutissimum* F.Muell., *Phyllorkis minutissima* (F.Muell.) Kuntze, *Oncophyllum minutissimum* (F.Muell.) D.L.Jones & M.A.Clem.

Heterotypic synonyms: *Bulbophyllum moniliforme* F.Muell. nom. illeg., *Bulbophyllum moniliforme* R.M.King, nom. illeg., *Dendrobium nummulifolium* R.King.

Morphology: Plant 0.2–0.3 cm tall, slowly creeping, pseudobulbs closely set, spaced up to 4 mm apart along a frequently branching rhizome, mat forming, roots very short. *Pseudobulb* 2–3 mm tall by 1 mm wide, globose, flattened, somewhat disc-like, hollow with internal stomata, wrinkled, yellowish green to reddish, unifoliate. *Leaf* 1 mm long, sessile, linear, scale-like, apex acute, lamina rapidly deciduous. *Inflorescence* a raceme, 3 mm long, terete, slender, borne laterally from base of pseudobulb. *Flower* 3–3.5 mm long, single, resupinate, spreading, campanulate, cream coloured with broad, reddish to purple blotches. The flowers vary in size and in the intensity of spotting or blotching.

Range, elevation and habitat: *Bulbophyllum minutissimum* is a widespread and locally common eastern Australian endemic, found in south east Queensland and south east New South Wales at elevations ranging from 5–1000 m. It is found in a variety of habitats (rain forest, open gum forest, rocky hillsides, mountain gorges, swamps, stream banks, coastal vegetation and mangroves) where it grows either as an epiphyte (often on *Ficus* or on the Hoop Pine, *Araucaria cunninghamii*, and other rainforest trees) or as a lithophyte, frequently in bright light in exposed situations. Plants grown in high light often take on a pinkish hue. Whilst common and able to form dense mats, the small size of *B. minutissimum* makes it inconspicuous. It is sometimes found on rocks growing with *Bulbophyllum bracteatum*. This species blooms in late spring to early summer in nature.

Culture recommendations: *Substrate* mount on cork or rough-barked hardwood, not tree fern. Not suited to potted culture. *Temperature* warm to intermediate daytime temperatures, cooler at night; in winter it can tolerate temperatures to near freezing for brief periods. *Light* bright to bright diffuse. *Watering* moist, but allow to dry slightly/briefly between watering. Do not keep wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, reducing this in winter.

Comments: A true “micro-mini”, *Bulbophyllum minutissimum* is, along with *B. globuliforme*, not only one of the tiniest *Bulbophyllum*, but also one of the



Figure 4.154 (above) *Bulbophyllum minutissimum* plants with flower (Grower: John Roberts, photo by Gary Yong Gee).

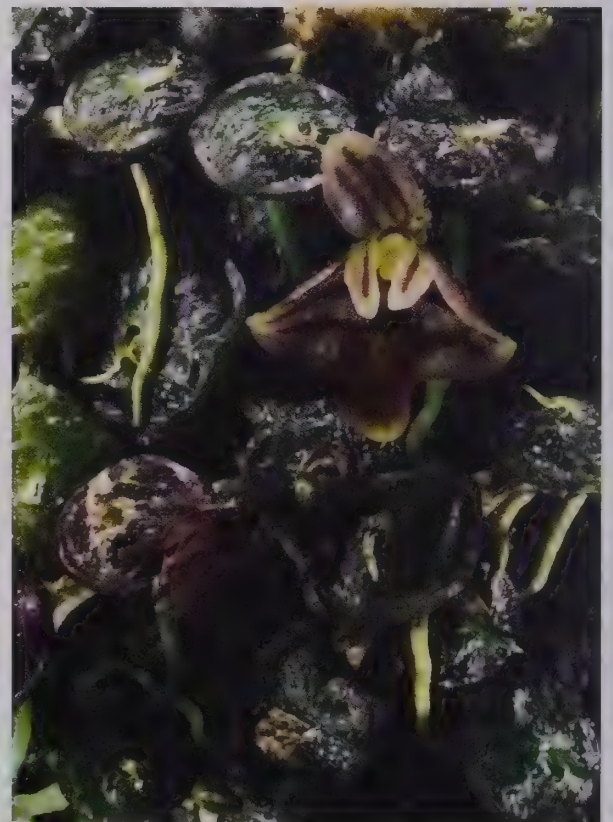


Figure 4.155 (above) *Bulbophyllum minutissimum* is a true miniature amongst orchids (Grower: Gerald McCraith).

BULBOPHYLLUM

smallest of all orchid species in general. Unfortunately, this species is almost never seen outside of Australia. Vegetatively, *Bulbophyllum minutissimum* resembles its very close relative *B. globuliforme*. However, in contrast with *B. globuliforme*, whose flowers stand on proportionately long inflorescences, the dark coloured and well-camouflaged flowers of *B. minutissimum* are only revealed with close and careful examination. The flowers of this species last 7–10 days, and plants may produce a flush of blooms over a period of a month or so in the spring, with occasional flowers sporadically during the rest of the year. This species belongs in section *Minutissima*, though Clements and Jones place *B. minutissimum* and *B. globuliforme* in a separate genus, *Oncophyllum* D.L. Jones and M.A. Clem.



Figure 4.156 (above) Mats of *Bulbophyllum minutissimum* pseudobulbs spreading over the surface of a lichen encrusted rock in Queensland, northern Australia (Photo: Mike Harrison).

BULBOPHYLLUM

Bulbophyllum mirum J.J.Sm.

Publication: *Icon. Bogor.* 3: t. 216 (1906)

Etymology: From the Latin *mira* (wonderful, marvellous), referring to the remarkable flower.

Homotypic synonyms: *Cirrhopetalum mirum* (J.J.Sm.) Schltr., *Rhytionanthos mirum* (J.J.Sm.) Garay.

Morphology: *Plant* to 10 cm tall, clumping, slowly creeping, pseudobulbs spaced to 2.5 cm apart along branching rhizome. *Pseudobulb* 1.5–2 cm tall by 1 cm wide, conical, ovoid, tetragonal, slightly compressed laterally, rounded to carinate edges. *Leaf* to 6 cm long, sometimes slightly larger, by 3.8 cm wide, subpetiolate, oblong to broadly ovate, apex obtuse to rounded, lamina erect to slightly spreading, thick, leathery, rigid, slightly rough texture, dark green to blue green, new foliage olive green with transverse reddish bands. *Inflorescence* a raceme, peduncle 1.5–3.5 cm long, flowers with subtending bracts, basally slender, horizontal, borne laterally from base of pseudobulb. *Flower* 2–3.5 (rarely to 6) cm long, 2 in number, simultaneous, resupinate, lateral sepals connate for entire length, minutely pustulose, dorsal sepal hooded, blooms barely opening, petals with whiskered palae (15–20 in number) that move in the slightest breeze. The flower varies in shape of synsepal from inflated and short to long and attenuate; flowers also vary greatly in terms of size and intensity of colour, patterning and spot size.

Range, elevation and habitat: *Bulbophyllum mirum* is found in Sumatra, Bali, Java, Peninsular Malaysia, Borneo and southern Thailand. It grows as a common epiphyte in moss on branches and trunks at elevations of 1000–1600 m. This species blooms in the spring and summer in nature, with records in Thailand for the month of June.

Culture recommendations: *Substrate* mount on a flat piece of cork using New Zealand *Sphagnum* moss, or in baskets using moss or fine bark mix to accommodate the creeping rhizome. Probably not well suited for pots unless a short, bulb-pan-like pot is used. *Temperature* intermediate. *Light* light shade. *Watering* moist, well-drained, not wet. Most likely benefits from short, dry periods during the winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: This species almost invariably has two flowers, each resembling a little boot with fringes, the paleae hanging out to the side; the flowers may be orientated 180° from one another or side by side. The flowers can be quite variable in overall size. The new foliage of this species is an attractive olive green with red transverse barring, but this trait is lost as the leaf matures. A similar, single flowered Sumatran species, *Bulbophyllum scotinochiton* J.J.Verm & P.O'Byrne, has flowers to 7.5 cm, with longer paleae. *Bulbophyllum mirum* belongs in section *Rhytionanthos*, itself sometimes included in section *Cirrhopetalum*. Flowers have been recorded almost every month of the year in cultivation.





Figure 4.157 (facing page) The flowers of *Bulbophyllum mirum* are borne laterally from the plants (Grower: White Oak Orchids).

Figure 4.158 (above) *Bulbophyllum mirum* usually produces its boot-like blooms in pairs (Grower: White Oak Orchids).

Figure 4.159 (below) Though readily identifiable, *Bulbophyllum mirum* flowers may vary considerably in size and pattern (Grower: White Oak Orchids).

BULBOPHYLLUM***Bulbophyllum moniliforme*** E.C.Parish & Rchb.f.**Publication:** *Trans. Linn. Soc. London* 30: 151 (1874)**Etymology:** From the Latin *monile* (necklace-shaped) and *formis* (form), referring to the chain of pseudobulbs.**Homotypic synonyms:** *Phyllorkis moniliformis* (E.C.Parish & Rchb.f.) Kuntze.**Morphology:** *Plant* to 1 cm tall, creeping, pseudobulbs clustered, much branched, mat forming. *Pseudobulb* to 0.5 cm tall by up to 0.5 cm wide, globose, erect to oblique, rugulose with age, shiny, slightly flattened (depressed), covered with quickly disintegrating papery bracts, leaf apical, unifoliate (either absent or quickly deciduous). *Leaf* 0.3–0.5 cm long by 0.1–0.15 cm wide, sessile, oblong elliptic, apex acute, apiculate, lamina erect, fleshy. *Inflorescence* a raceme, peduncle to 2 cm long, erect to suberect, borne laterally from base of pseudobulb. *Flower* to 0.7 cm wide, single, resupinate, spreading, campanulate, proportionately large, lateral sepals connate at base, spreading widely, proportionately smaller dorsal sepal connate to the lateral sepals at base, forward pointing, lip forward pointing.**Range, elevation and habitat:** *Bulbophyllum moniliforme* occurs in Laos, Cambodia, Vietnam, India (Assam), Myanmar and southern Thailand, at elevations ranging from near sea level to 800 m. It can be locally common, growing as an epiphyte and occasionally as a lithophyte. One herbarium record (Kew) from Thailand indicates that it was found growing on the trunk of an *Areca* palm at 10 m above sea level on Nang Yuan island. Records for bloom-times in India show February, June and July; for Thailand, November; and for Myanmar, January.**Culture recommendations:** *Substrate* mount on cork or rough-barked hardwood using only a little moss; it may do better on a horizontal raft. Not suited to potted culture. Winter dormant. *Temperature* warm to intermediate. *Light* light shade. *Watering* moist, not wet, drying slightly and briefly between waterings. *Humidity* 50 %. *Air movement* good. *Propagation* division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing or omitting in winter.**Comments:** *Bulbophyllum moniliforme* has tiny, squat pseudobulbs with nearly obsolete leaves. Though it has been reported that some plants from Vietnam may have leaves present when in flower, this has not been independently confirmed. The sole record, a specimen collected from Lam Dong province, Blao, is from a region now densely populated and no longer forested; moreover, the elevation is rather high, at 1100–1300 m (Leonid Averyanov, pers. comms.). Relative to plant size, the proportionately huge, striped flowers age to an attractive, solid orange colour. Not an easy plant to cultivate, some growers find that horizontal rafts work better than a vertical mount. This species blooms sporadically throughout the year, but has also been known to produce a flush of blooms in the autumn. *Bulbophyllum moniliforme* belongs in section *Minutissima*.**Figure 4.160 (above)** Pseudobulbs and flowers of *Bulbophyllum moniliforme* (Grower: Howard Gunn).**Figure 4.161 (above)** A *Bulbophyllum moniliforme* flower in detail (Grower: Howard Gunn).

BULBOPHYLLUM

Bulbophyllum newportii (F.M.Bailey) Rolfe

Publication: *Orchid Rev.* 17: 94 (1909)

Etymology: Named for Howard Newport, an instructor in coffee culture, who discovered the species.

Homotypic synonyms: *Sarcochilus newportii* F.M.Bailey, *Adelopetalum newportii* (F.M.Bailey) D.L.Jones & M.A.Clem.

Morphology: *Plant* 3.5–6.5 cm tall, densely clumping, clustered, mat forming, much-branching, pseudobulbs spaced 0.8–1.5 cm apart along rhizome. *Pseudobulbs* 0.8–1.5 cm tall by 0.8–1.2 cm wide, nearly orbicular to ovoid, grooved or ridged, unifoliate. *Leaf* to 8 cm long by 0.8–1.2 cm wide, shortly petiolate, narrowly oblong to linear, apex acute, lamina erect, stiff, thin textured, dark green. *Inflorescence* a raceme, semi-congested near apex, 5–10 cm long, erect to suberect, filiform. *Flower* 4–8 mm in diameter, 1–8 in number, simultaneous, resupinate, not spreading widely, campanulate, lip narrow, curved downwards and yellow in colour. Flower colour varies from white to cream, occasionally with a pink blush, segments often with a few faint pink longitudinal stripes, particularly on the lateral sepals.

Range, elevation and habitat: *Bulbophyllum newportii* is a widespread and locally common northeastern Australian endemic. It is found in northern Queensland at 600–1200 m where it grows as an epiphyte in various habitats such as rain forest, cloud forest, wet sclerophyllous forest in heavy shade, and on rocks and cliff faces, often with leaf litter on the plants. It is sometimes found growing with *B. evasum* (on rocks), *Dendrobium agrostophyllum* and *D. adae*. This species blooms in late spring in nature, and is not host specific.

Culture recommendations: *Substrate* mount with a little moss on cork or hardwood, or pot using small bark mix. Since the species is somewhat mat forming, it will display better mounted. *Temperature* intermediate to cool. This species can take temperatures close to freezing in the winter, but is probably best kept above 10 °C (50 °F). *Light* bright diffuse to light shade. *Watering* moist, well-drained, drying briefly between waterings. Reduce in winter when dormant. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: This charming species, like many of the small epiphytic orchids from Australia, is not commonly seen outside of that country. Those cultivating this species are encouraged to propagate and distribute plants in order to make them more available elsewhere. The plants have delicate, translucent white flowers, occasionally blushed pink, that are held attractively above the leaves. *Bulbophyllum newportii* belongs in section *Adelopetalum* and blooms in the spring in cultivation.



Figure 4.162 (above) Flowers of *Bulbophyllum newportii*, an Australian endemic (Grower: Andy's Orchids).



Figure 4.163 (above) The delicate blooms of *Bulbophyllum newportii* are generally borne erect (Grower: Marni Turkel).

BULBOPHYLLUM

Bulbophyllum ovalifolium (Blume) Lindl.

Publication: *Gen. Sp. Orchid. Pl.* 49 (1830)

Etymology: From the Latin *ovalis* (oval) and *folius* (leaf) referring to the egg-shaped leaves of this species.

Homotypic synonyms: *Diphyes ovalifolia* Blume, *Phyllorkis ovalifolia* (Blume) Kuntze.

Heterotypic synonyms: *Diphyes pusilla* Blume, *Bulbophyllum parvulum* Lindl., *Phyllorkis parvula* (Lindl.) Kuntze, *Bulbophyllum tineae* Ridl., *Bulbophyllum ovatilabellum* Seidenf.

Morphology: Plant to 3 cm tall, occasionally larger, creeping, much branched, mat forming, pseudobulbs closely set, arranged in straight lines, chain-like. *Pseudobulb* 0.4–1 cm tall by 0.4–0.8 cm wide, ovoid to globose or oblong, somewhat laterally flattened, nearly prostrate to oblique, new growth arising near apex of previous pseudobulb. *Leaf* 1.5 cm long by 0.7–1 cm wide, petiolate, oval to oblong to elliptic, apex obtuse, lamina erect to suberect, thinly leathery. *Inflorescence* a raceme, 5–6 cm long, peduncle 3 cm long, erect to suberect, filiform, borne laterally from the base of the pseudobulb. *Flower* 0.8–2 cm wide, single, resupinate, widely spreading, large lateral sepals connate at base, dorsal sepal forward-pointing, often hooded, petals very small, lip lightly papillose to strongly verrucose. Flower varies in background colour from red, orange, yellow or cream with slightly darker veins, to whitish with orange stripes; the lip varies in colour, but is often red to orange.

Range, elevation and habitat: *Bulbophyllum ovalifolium* is a common, widespread southeast Asian species, found in Thailand, Peninsular Malaysia, Singapore, Borneo, Sumatra, Java, the Lesser Sunda Islands (Flores) and Sulawesi. In Malaysia, it occurs on trees on mountain ridges at 1700 m, and on trees by streams at about 1200 m. In Java, it is found at elevations of 700–2500 m, where it grows as an epiphyte on mossy tree trunks and branches in montane forest. In nature it may bloom at any time of year.

Culture recommendations: *Substrate* best mount vertically or horizontally on cork, rough-barked hardwood or tree fern, using New Zealand *Sphagnum* moss. If potted, it is best to use moss in shallow pots. *Temperature* warm to intermediate. *Light* bright to medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* easily by division, or seed.

Comments: *Bulbophyllum ovalifolium* is a cute little plant with bulbs that essentially lay on their sides. Variable in flower and plant size, as well as in flower colour, all forms have very full lateral sepals, a tiny dorsal sepal, and a characteristic, warty lip. An easy to grow species, *Bulbophyllum ovalifolium* flowers often and at any time of the year. This species is in section *Macrocaulia*, though it has also been included section *Monilibulbus*.

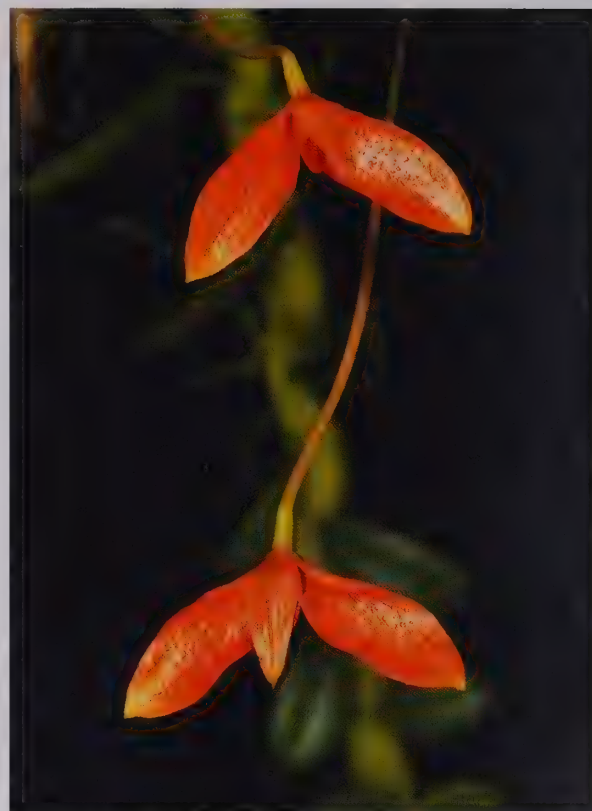


Figure 4.164 (above) A pair of *Bulbophyllum ovalifolium* blooms (Grower: White Oak Orchids).



Figure 4.165 (above) *Bulbophyllum ovalifolium* growing in situ on Mount Kinabalu, Borneo (Photo: Mary Gerritsen).

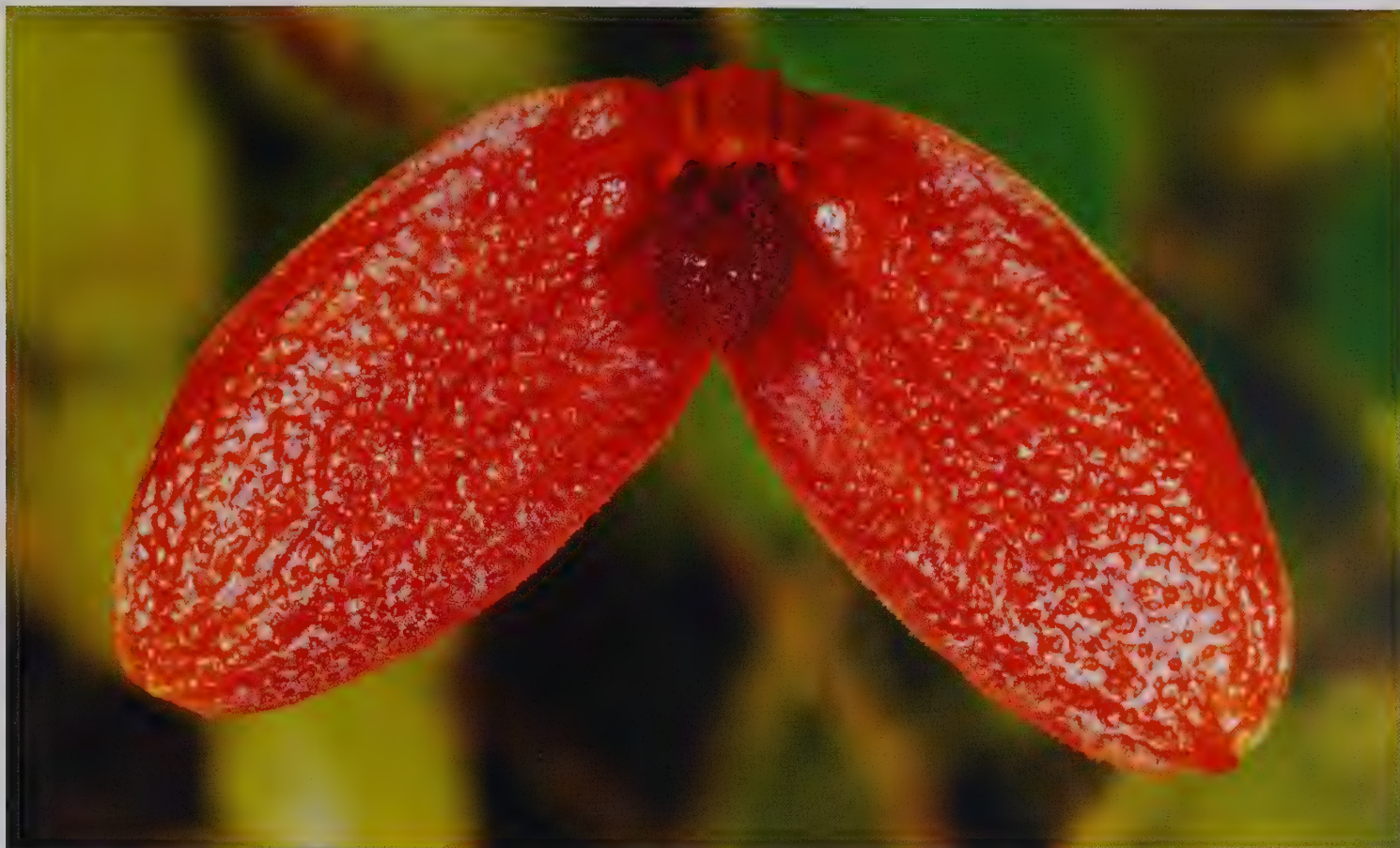


Figure 4.166 (above) *Bulbophyllum ovalifolium* red-flowered form (Grower: Judy Carney).

Figure 4.167 (below) A yellow-flowered form of *Bulbophyllum ovalifolium* (Grower: Orchid Species Plus).

BULBOPHYLLUM

Bulbophyllum pardalotum Garay, Hamer & Siegerist

Publication: *Lindleyana* 10: 177 (1995)

Etymology: From the Greek *pardalotos* (spotted like a leopard), referring to the red-spotted flowers.

Morphology: *Plant* to 7 cm tall, creeping, pseudobulbs spaced up to 4 cm apart along rhizome, much branching. *Pseudobulb* to 2.5 cm tall by 1 cm wide, ovoid to tetragonal, unifoliate. *Leaf* to 6 cm long by 1.5 cm wide, subpetiolate, ovate to narrowly oblong, apex obtuse, lamina erect to suberect, leathery, flexible. *Inflorescence* a raceme, peduncle 4–9 cm long, ovary to 1.4 cm long, erect to horizontal, filiform, longer than leaves, borne laterally from base of pseudobulb. *Flower* 2–3 cm long, single, resupinate, spreading, lip hinged, yellowish to orangey yellow with an overlay of spotting usually coalescing into stripes, flowers lasting 7 to 10 days, but closing daily by mid-morning.

Range, elevation and habitat: *Bulbophyllum pardalotum* is a Philippine endemic (Luzon, from the provinces of Nueva Ecija and Nueva Viscaya), where it grows as an epiphyte on upright branches and the trunks of trees with little moss around the roots. It favours the well lit areas of moist, evergreen montane forest at elevations up to 2000 m. This species has a limited distribution, but appears to be secure. It is believed to bloom throughout the year in nature.

Culture recommendations: *Substrate* mount preferably on a large, flat piece of cork or tree fern to allow for the creeping rhizome, or in baskets using New Zealand *Sphagnum* moss or fine bark mix. If potted, a shallow bulb-pan type container is best. *Temperature* intermediate. *Light* light shade to medium shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: A cheerful little species, *Bulbophyllum pardalotum* has lovely, bright yellow flowers decorated with vibrant red spots and blotches that align into stripe-like patterns. In common with another closely-related species, *B. elassoglossum*, the flowers of *B. pardalotum* are usually closed by mid-morning. Individual flowers may last up to 10 days, and the plant may bloom often and in any month of the year. Easy to grow and propagate, this is definitely a species that you will want to pass along to your friends. A similar Philippine species, *B. williamsii*, is distinguished by its much longer, narrower segments. *Bulbophyllum pardalotum* belongs in section *Leptopus*.



Figure 4.168 (above) The striking flower of *Bulbophyllum pardalotum* (Grower: Marni Turkel).



Figure 4.169 (above) A bloom of the related *Bulbophyllum williamsii* (Grower: Alan Koch, Gold Country Orchids).

BULBOPHYLLUM

Bulbophyllum patella J.J.Verm.

Publication: *Orchid Monogr.* 7: 168 (1993)

Etymology: From the Latin *patella* (a small pan), with reference to the shape of the lip.

Homotypic synonym: *Peltopus patella* (J.J.Verm.) Szlach. & Marg.

Morphology: *Plant* 3–9 cm tall, creeping, pseudobulbs closely set, branching. *Pseudobulb* to 1.8 cm tall by 0.8 cm wide, ovoid-conical, ribbed, clustered, unifoliate. *Leaf* to 8 cm long by 2 cm wide, folded at base, oblong-elliptic, apex obtuse, lamina erect to suberect, rigid, leathery, glossy when immature, lighter underneath. *Inflorescence* a raceme, peduncle to 9 cm long, slender, borne laterally from pseudobulb. *Flower* 1.2–2.5 cm wide, single, resupinate, widely spreading, dorsal sepal hooded, sepals yellow to orange, sometimes veined purple, flowers partially closing daily by mid-afternoon.

Range, elevation and habitat: *Bulbophyllum patella* occurs in the Western and Southern Highlands provinces of New Guinea at elevations of 1600–2500 m where it grows as a locally common epiphyte in primary, montane, moss-laden forest and also terrestrially among grass in clay soils. This species may flower in any month of the year.

Culture recommendations: *Substrate* mount on cork, using New Zealand *Sphagnum* moss. May also do well on rough-barked hardwood or tree ferns, or pot shallowly in moss or fine bark mix. *Temperature* intermediate to intermediate cool. *Light* medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.

Comments: *Bulbophyllum patella* is not a common species in collections, at least in the United States, but it should be. The full-shaped flower is a lovely yellow colour, often with a little bit of red at the base of the lip. The fairly short-lived flowers, which persist for about 1 week, tend to close somewhat in the late afternoon to early evening, with the sepals curling inwards. Even so, plants may bloom throughout the year. *Bulbophyllum patella* belongs in section *Peltopus*.



Figure 4.170 (above) The handsome little flower of *Bulbophyllum patella*, a species endemic to the upland areas of New Guinea (Grower: Hanging Gardens).

BULBOPHYLLUM

Bulbophyllum pecten-veneris (Gagnep.) Seidenf.

Publication: *Dansk Bot. Ark.* 29: 37 (1973, publ. 1974)

Etymology: From the Latin *pecteni* (comb) and *veneris* (of beauty), “Venus’ comb”, referring to the fringed petals and dorsal sepal.

Homotypic synonym: *Cirrhopetalum pecten-veneris* Gagnep.

Heterotypic synonyms: *Cirrhopetalum miniatum* Rolfe, *Cirrhopetalum flaviflorum* Tang, S.Liu & H.Y.Su, *Bulbophyllum flaviflorum* (Tang, S.Liu & H.Y.Su) Seidenf., *Bulbophyllum tingabarinum* Garay, Hamer & Siegerist, *Bulbophyllum tingabarinum* f. *flavum* O.Gruss.

Morphology: Plant to 9 cm tall, densely clumping, pseudobulbs clustered to shortly spaced, branching. *Pseudobulb* to 1.8 cm long by 2 cm wide, ovoid to nearly globose, wrinkled, squat, subtly tetragonal to many angled, leaf apical, unifoliate. *Leaf* to 7 cm long by 1.8 cm wide, shortly petiolate, conduplicate at base, linear-oblong to oblong-elliptic, apex acute to obtuse, shallowly notched, lamina suberect, slightly arcuate, leathery, fleshy, rigid, dorsal dark glossy green, ventral side lighter, minutely punctate. *Inflorescence* umbellate raceme, to 10 cm long, slender, descending to pendent, borne laterally from base of pseudobulb. *Flower* to 10 cm long, to 14 in number (rarely more), simultaneous, resupinate, lateral sepals connate towards base, diverging before midway point, flowers spreading, but dorsal sepal tends to be hooded and petals forward, dorsal sepals and petals fringed and, except for the sepaline tails, campanulate. Flowers vary in size and in colour from creamy white, to yellow or orange.

Range, elevation and habitat: *Bulbophyllum pecten-veneris* is a widespread species that occurs in southern China (southern Anhui, northern Fujian, Guangxi, Hainan, Hong Kong, western Hubei), Laos, Vietnam, and central and southern Taiwan. In Taiwan, it is found at elevations of approximately 1000 m. In Vietnam it has been found at elevations of 800–1200 m, growing in remnant, stunted, primary evergreen broadleaf forest along the tops of rocky ridges. In protected areas it is a common species (Leonid Averyanov, pers. comms., 2012). It flowers from April to September in nature.

Culture recommendations: *Substrate* mount on cork, rough-barked hardwood or tree fern using New Zealand *Sphagnum* moss, or in pots or baskets with moss or fine bark mix *Temperature* intermediate. *Light* medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.

Comments: One of the most enticing species of section *Cirrhopetalum*, *Bulbophyllum pecten-veneris* has wonderful, fringed flowers with proportionately long, nearly pendent lateral sepals. It blooms frequently and sporadically throughout the year, and well-grown plants left undivided can make stunning specimens. While *B. tingabarinum* and *B. flaviflorum* are seen as individual species by some, they are now classified as synonyms of



Figure 4.171 (above) The fine flowers of a *Bulbophyllum pecten-veneris* white form (Grower: Golden Gate Orchids).

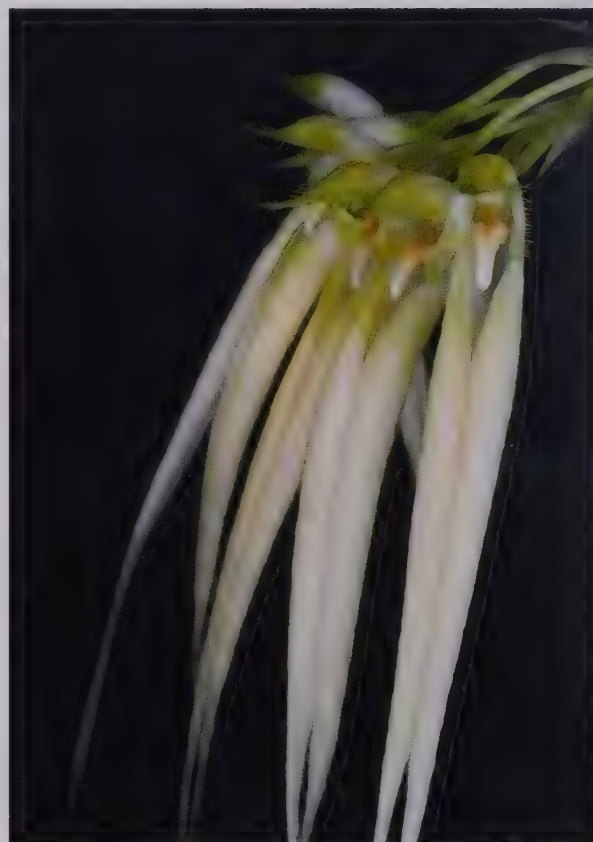


Figure 4.172 (above) *Bulbophyllum pecten-veneris* flower detail (Grower: Petite Plaisance).

BULBOPHYLLUM

B. pecten-veneris and may be colour forms. The flowers of *B. pecten-veneris* are creamy white, whereas those of *B. tingabarinum* are a bright, dark orange, whilst *B. flaviflorum* sports brilliant yellow to greenish yellow blooms. Garay *et al.* observe that *B. flaviflorum* and *B. tingabarinum* differ in flower size, as well as in some characteristics of the petals, column, stelidia and anther. Regardless of how these taxa are treated taxonomically, all three are well worth growing.

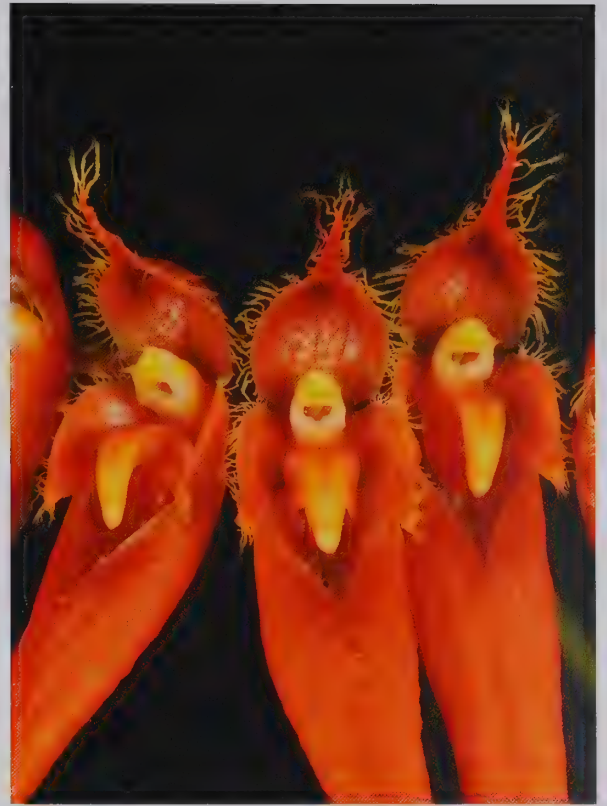


Figure 4.173 (above) Detail of a *Bulbophyllum pecten-veneris* orange-flowered form (Grower: Marni Turkel).



Figure 4.174 (above) The simultaneous blooms of a *Bulbophyllum pecten-veneris* red-flowered form displayed to full effect (Grower: Judy Carney).

Figure 4.175 (overleaf) The enchanting flowers of a *Bulbophyllum pecten-veneris* yellow-flowered form (Grower: Orchid Species Plus).



BULBOPHYLLUM

Bulbophyllum planibulbe (Ridl.) Ridl.

Publication: *Mat. Fl. Malay. Penins.* 1: 79 (1907)

Etymology: From the Latin *planis* (flat) and the Greek *bulbo* (bulb), referring to the flattened pseudobulbs of this species.

Homotypic synonym: *Cirrhopetalum planibulbe* Ridl.

Heterotypic synonym: *Bulbophyllum tenerum* Ridl.

Morphology: *Plant* creeping, flattened, pseudobulbs and leaf appressed to substrate, spaced to 5 cm apart along branched rhizome, mat forming. *Pseudobulbs* to 1.5 cm tall by 1 cm wide, ovoid to ellipsoid, strongly laterally compressed, parallel to substrate, reddish to brownish-purple, new growth appearing near apex of previous pseudobulb, unifoliate. *Leaf* to 2.5 cm long by 1 cm wide, sessile, oval to oblong, apex obtuse to rounded, lamina leathery. *Inflorescence* sub-umbellate raceme, to 9 cm long, erect to descending, slender, lax, reddish to purple, borne laterally from base of pseudobulb. *Flower* 1.5–2 cm tall, 2–5 (occasionally more) in number, simultaneous, resupinate, spreading, dorsal sepal hooded, forward pointing.

Range, elevation and habitat: *Bulbophyllum planibulbe* occurs in southern Thailand, Malaysia and Sumatra, where it grows as an epiphyte on mossy tree trunks and branches in lowland tropical forest. Records show that this species has been observed flowering in Thailand in March. Conservation status unknown.

Culture recommendations: *Substrate* this species, with its unusual growth habit, must be grown on a flat mount such as cork bark or tree fern, using New Zealand *Sphagnum* moss. It is not suited to pot culture. *Temperature* warm. *Light* bright to medium shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: This unusual member of section *Desmosanthes* has proportionately large, purplish flowers that are presented on an erect inflorescence with a *Cirrhopetalum*-like umbel. This species also has a peculiar plant habit, with attractive, flattened, brownish pseudobulbs and contrasting green leaves. Both leaves and pseudobulbs appear almost squashed against the substrate, and even more curiously, new pseudobulbs are borne from the shoulder of previous ones. This species, whilst not rare, is certainly not seen enough in collections. It flowers in mid- to late summer in cultivation.



Figure 4.176 (above) The finely coloured flowers of *Bulbophyllum planibulbe* (Grower: Judy Carney).



Figure 4.177 (above) Detail of a *Bulbophyllum planibulbe* flower (Grower: Judy Carney).

BULBOPHYLLUM

Bulbophyllum plumatum Ames

Publication: *Orchidaceae* 5: 184 (1915)

Etymology: From the Latin *pluma* (feather, plume) referring to the flower.

Homotypic synonym: *Rhytionanthos plumatum* (Ames) Garay.

Heterotypic synonym: *Bulbophyllum jacobsonii* J.J.Sm.

Morphology: *Plant* 7.5–11.5 cm tall, slowly creeping, pseudobulbs closely set to 2–3 cm apart along branching rhizome. *Pseudobulb* 2.5 cm tall by 1 cm wide, conical-ovoid, tetragonal, sides concave on older pseudobulbs, slightly compressed, unifoliate. *Leaf* 7–10 cm long by 4 cm wide, subpetiolate, oblong, apex acute to obtuse, apiculate, lamina erect to slightly spreading, leathery, rigid, dark green, new foliage olive green with faint transverse reddish bands. *Inflorescence* a raceme, to 15 cm long, descending to pendent, flowers with subtending bracts, slender, flecked with reddish purple, borne laterally from base of pseudobulb. *Flower* 7–11 cm long, usually 4 in number, simultaneous, resupinate, lateral sepals connate for entire length, proportionately small hooded dorsal sepal, small obscure petals with paleae.

Range, elevation and habitat: *Bulbophyllum plumatum* occurs in moist montane forest in Borneo, Sumatra, Java, Bali and the Philippines from 1000–1500 m. In Borneo, this species blooms from July to August. Conservation status unknown.

Culture recommendations: *Substrate* for the finest display of the pendulous inflorescences, this species is best mounted with New Zealand *Sphagnum* moss on a flat piece of cork (use of tree fern is debated) appropriately sized to allow for the rambling rhizome, or in a basket using moss or fine bark mix. *Temperature* intermediate. *Light* medium shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: *Bulbophyllum plumatum* is a favourite of many growers and is often seen in collections. The graceful and fairly large flowers, which are borne on a long, slender inflorescence, are surprisingly always four in number. As in *B. mirum*, the new leaves are an attractive olive-green with transverse reddish barring, although this trait rapidly fades as the leaf matures. The recently described *Bulbophyllum treschii* Jenny is the same colour as *B. plumatum*, but is distinguished by its distinctly wrinkled sepals and larger (to 15 cm or more) flower. *Bulbophyllum treschii* occurs in Peninsular Malaysia.

Another closely related species, *Bulbophyllum thiurum*, also from Peninsular Malaysia, has yellow flowers to 10 cm long, and reddish-brown spotting on the dorsal sepal and occasionally at the base of the lateral sepals. Both



Figure 4.178 (above) A virtual chandelier of graceful, pendent *Bulbophyllum plumatum* flowers (Grower: Howard Gunn).

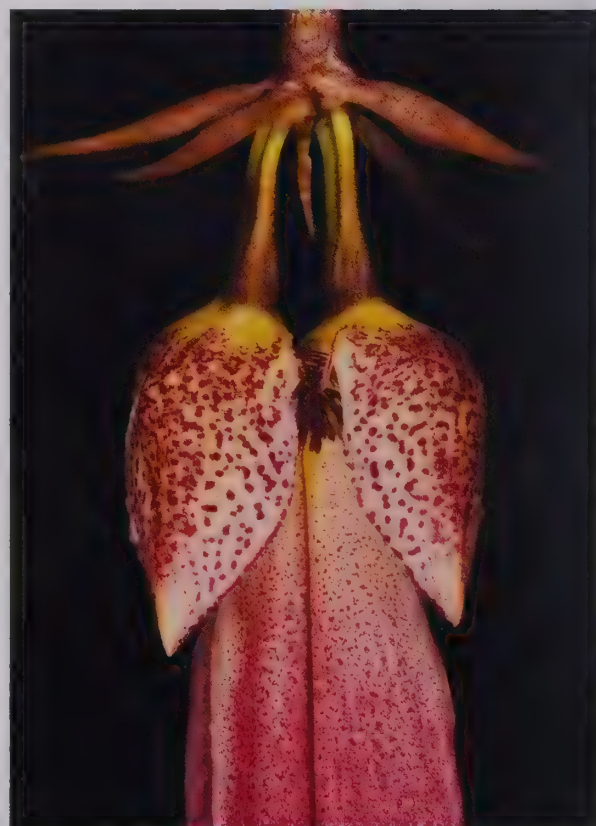


Figure 4.179 (above) The flowers of *Bulbophyllum plumatum* typically occur in fours (Grower: Marni Turkel).

BULBOPHYLLUM

of the above mentioned relatives are much rarer (and more expensive) in cultivation than *B. plumatum*. *Bulbophyllum plumatum* and its two relatives all belong to section *Rhytionanthus*, itself placed within section *Cirrhopetalum* by certain taxonomists. *Bulbophyllum plumatum* can bloom in any month of the year and blooms frequently in cultivation.



Figure 4.181 (above) Attractive speckling atop the dorsal sepal of *Bulbophyllum thiuurum* (Grower: Cindy Hill).



Figure 4.180 (above) Yellow blooms of the related taxon *Bulbophyllum thiuurum* (Grower: Orchid Species Plus).



Figure 4.182 (above) The recently described *Bulbophyllum treschii* is another close relative (Grower: Orchid Species Plus).

BULBOPHYLLUM***Bulbophyllum psychoon* Rchb.f.****Publication:** *Gard. Chron.* n.s. 170 (1878)**Etymology:** From the Greek *psychodes* (butterfly) and *-oon* (emphatic suffix), referring to the flower.**Homotypic synonym:** *Phyllorkis psychoon* (Rchb.f.) Kuntze.

Morphology: *Plant* to 9 cm tall, slowly creeping, pseudobulbs closely set, much branching. *Pseudobulb* 1.3 cm by 1 cm, ovoid to conical, shallowly ribbed, dark green, partially obscured by reddish-brown bracts, leaf apical, unifoliate. *Leaf* to 8 cm long by 1.5 cm wide, petiolate, narrowly ovate, apex acute to obtuse, lamina erect, fleshy, flexible, thinly leathery, minutely punctate and suffused with purple underneath. *Inflorescence* an umbellate raceme, peduncle to 7.5 cm, erect to suberect, filiform, sometimes with reddish pigment, borne laterally from base of pseudobulb. *Flower* 1–1.2 cm tall, to 8 (occasionally more) in number, simultaneous, resupinate, spreading, dorsal sepal hooded, malodorous. Flowers vary slightly in shape and in colour from pinkish, to creamy yellow, to yellowish, often with reddish suffusion, and markings on lip vary in suffusion from pink to maroon.

Range, elevation and habitat: *Bulbophyllum psychoon* has been found in Vietnam, India and Thailand, though little is known about the range of habitat or elevation. In nature, this species blooms in spring and summer, though in Vietnam it has been found blooming in December. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark or hardwood, using New Zealand *Sphagnum* moss, or pot using moss or fine bark mix. *Temperature* plants in cultivation do very well in intermediate conditions. *Light* light shade. *Watering* keep moist and well-drained, not wet. In light of the countries where this species occurs, plants may experience a dry period during the winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: The umbel of attractive, if somewhat foetid, variably coloured flowers of this species is held attractively above the leaves. A floriferous, easy to grow species, *Bulbophyllum psychoon* tends to bloom in late spring to mid-summer, though flowers have also been recorded in early winter. It belongs to section *Desmosanthes*. It is somewhat surprising how little information is available for this species despite the fact that it is not rare in cultivation.



Figure 4.183 (above) Clustered, pinkish blooms of *Bulbophyllum psychoon* (Grower: Marni Turkel).

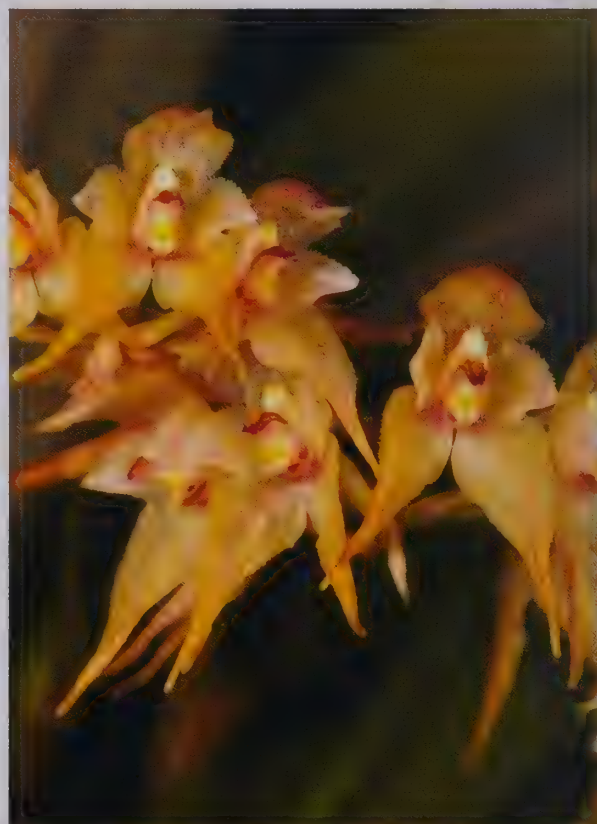


Figure 4.184 (above) The pretty flowers of *Bulbophyllum psychoon* are not attractively scented (Grower: Marni Turkel).



Figure 4.185 (above) The flowers of a *Bulbophyllum psychoon* cream-coloured variant (Grower: Marni Turkel).

Figure 4.186 (below) Blooms of a handsome, yellow-flowered form of *Bulbophyllum psychoon* (Grower: Marni Turkel).



BULBOPHYLLUM***Bulbophyllum retusiusculum* Rchb.f.****Publication:** *Gard. Chron.* 1182 (1869)**Etymology:** From the Latin *retusus* (shallow or slightly notched), probably referring to the minute notch at the apex of the synsepal.**Homotypic synonyms:** *Cirrhopetalum retusiusculum* (Rchb.f.) Hook.f., *Phyllorkis retusiuscula* (Rchb.f.) Kuntze.**Heterotypic synonyms:** *Bulbophyllum flavisepalum* Hayata, *Cirrhopetalum flavisepalum* (Hayata) Hayata, *Cirrhopetalum micholitzii* Rolfe, *Cirrhopetalum oreogenes* W.W.Sm., *Bulbophyllum oreogenes* (W.W.Sm.) Seidenf., *Cirrhopetalum touranense* Gagnep., *Bulbophyllum langbianense* Seidenf. & Smitinand, *Bulbophyllum oreogenes* (W.W.Sm.) Seidenf., *Bulbophyllum retusiusculum* var. *oreogenes* (W.W.Sm.) Z.H.Tsi.**Morphology:** *Plant* 2.5–13 cm tall, creeping, slender rhizome, pseudobulbs spaced 1–3 cm apart along branching rhizome. *Pseudobulb* 0.5–2.5 (to 3) cm tall by 0.5–1.3 cm wide, conical-narrowly ovoid, shallowly ribbed when mature, erect, suberect to oblique, unifoliate. *Leaf* 1.6–10 cm long by 0.4–2 cm wide, shortly petiolate to sessile, folded at base, linear-oblong, apex obtuse to rounded, lamina erect to suberect, arcuate, leathery, semi-flexible to rigid. *Inflorescence* an umbellate raceme, to 14 cm long, ascending to descending, slender, borne laterally from base of pseudobulb. *Flower* 1.3–3.5 cm long, to 16 in number, simultaneous, resupinate, lateral sepals connate for majority of length (except apices) forming synsepal with shallow notch at the apex, flowers spreading but dorsal sepals and petals not spreading widely. Flower colour is quite variable, with synsepals that are yellow, brownish, orange or dark red, and every colour in between, and dorsal sepals and petals that are usually striped and often darker in colour. The entire flower may also be a solid pale to bright yellow. The extremely variable synsepal ranges from narrow to broadly ovate in outline, always with a notch at the apex.**Range, elevation and habitat:** *Bulbophyllum retusiusculum* is widespread, with recorded collections from Bhutan, China (provinces of Gansu, Guizhou, Hainan, Hubei, Hunan, Sichuan, Tibet, and Yunnan), India, Laos, Myanmar, Malaysia, Nepal, Taiwan, Thailand and Vietnam (provinces of Cao Ban, Dak Lak, Hà Giang, Kon Tum, Lai Châu, Ninh Thuận, Quảng Bình and Sơn La). It grows as an epiphyte or lithophyte at elevations ranging from 500–2740 m. In China it grows in humid, wet, montane forest on tree trunks and large branches thickly covered with moss. In Vietnam, this very common species has been found in various habitats, including open primary coniferous (sometimes mossy) forest, dense broad-leaved montane evergreen forest, primary dry evergreen forest, and mixed semi-deciduous forest along the tops of limestone ridges, steep granite slopes and along stream slopes. In Taiwan it is also very common, being generally found at elevations of 500–1500 m throughout the mountainous portions of the island. This species blooms from September to November in Taiwan, between September and December in China, and in May in Vietnam.**Culture recommendations:** *Substrate* mount on a broad or flat piece of cork bark with New Zealand *Sphagnum* moss to accommodate the rambling rhizome, or pot in a shallow bulb pan or basket using moss or fine bark mix. *Temperature* intermediate to cool; before growing this species cool, it is best to know the provenance of your plant. *Light* light shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, greatly reducing or halting the application of fertiliser during winter.**Comments:** With its stunning pinwheel of small, but brightly coloured flowers, this species is truly eye-catching. The cluster of blooms can be quite congested, with up to as many as 16 flowers in a semi-circle formation. A favourite of the authors is the illustrated bright yellow form with red striping on the dorsal sepals and petals. There is an invalidly named plant in the trade, marketed as *B. sulphureum*; it has flowers that are nearly identical in form to those of *B. retusiusculum*, but it differs in having more closely set pseudobulbs and flowers, and has entirely yellow flowers. *Bulbophyllum retusiusculum* tends to bloom in early to mid-summer in cultivation, but flowering times in the winter and spring have also been recorded. This species belongs in section *Cirrhopetalum*.**Figure 4.187 (facing page, above)** A brightly coloured spread of *Bulbophyllum retusiusculum* flowers (Grower: Hanging Gardens).**Figure 4.188 (facing page, below)** An impressive array of yellow-flowered *Bulbophyllum retusiusculum* blooms (Grower: Eric Sayle).**Figure 4.189 (overleaf)** Flowers of *Bulbophyllum* cf. *retusiusculum* var. *sulphureum* (Grower: Hanging Gardens).



BULBOPHYLLUM***Bulbophyllum rufilabrum*** C.S.P.Parish ex Hook.f.**Publication:** *Fl. Brit. India* 5: 761 (1890)**Etymology:** From the Latin *rufi* (red) and *labrum* (edge lip, rim), referring to the appearance of the labellum.**Homotypic synonym:** *Phyllorkis rufilabra* (C.S.P.Parish ex Hook.f.) Kuntze.**Morphology:** *Plant* to 10 cm tall, creeping, pseudobulbs clustered to spaced up to 5 cm apart along branching rhizome, rooting at base. *Pseudobulbs* 2.5 cm tall by up to 2 cm wide, orbicular to ovoid to conical, squat, multi-angular, often tetragonal, covered in short-lived papery sheaths, leaf apical, unifoliate. *Leaf* to 10 cm long by up to 3.3 cm wide, shortly petiolate, conduplicate near base, elliptic-oblong to ovate to obovate, apex obtuse to acute, minutely bilobate, lamina spreading to erect, leathery, somewhat flexible, new growths tinged with purple on underside. *Inflorescence* a congested raceme, short pedunculate, to 8 cm long, descending to pendent, somewhat slender, borne laterally from base of pseudobulb. *Flower* to 0.6 cm tall, 10–12 in number, simultaneous, resupinate.**Range, elevation and habitat:** *Bulbophyllum rufilabrum* occurs in Myanmar, southern Thailand and possibly India, at elevations of 500–600 m. Details of the habitat are unknown. In nature, plants bloom from January to February, although an October record exists for Thailand. Conservation status unknown.**Culture recommendations:** *Substrate* mount on a flat piece of cork bark, using New Zealand *Sphagnum* moss to accommodate the rambling rhizome, or pot in shallow bulb pan or basket using moss or fine bark mix. *Temperature* warm to intermediate. *Light* bright diffuse to light shade. *Watering* moist, allow to dry slightly between watering. In light of the countries where this species occurs, plants may experience some sort of dry period during the winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, greatly reducing or halting the application of fertiliser during winter.**Comments:** *Bulbophyllum rufilabrum* is possibly the smallest species in the often malodorous section Careyanum. This attractive plant has handsome leaves with a purplish ventral and a dark blue-green dorsal side, while the pseudobulbs are shapely and a dark green to brown in colour. Like many of the species in this section, the finger-like inflorescence bears a congested, pendent spike of flowers. Additionally, it tends to have many more flowers in collections than in nature. It blooms in the autumn to early winter in cultivation.**Figure 4.190 (above)** Flower detail of *Bulbophyllum rufilabrum* (Grower: Howard Gunn).**Figure 4.191 (above)** The densely flowered inflorescence of *Bulbophyllum rufilabrum* (Grower: Howard Gunn).

BULBOPHYLLUM

Bulbophyllum rupicola Barb.Rodr.

Publication: *Gen. Spec. Orchid.* 1: 39 (1877)

Etymology: From the Latin *rupicola* (rock dweller), referring to the growth habit of the species in its natural habitat.

Morphology: *Plant* to 6 cm tall (occasionally larger), creeping, pseudobulbs clustered, branching. *Pseudobulb* to 2 cm by up to 1.6 cm, globose to ovoid, sometimes slightly depressed at apex, sub-tetragonal, shiny, papery bracts, unifoliate. *Leaf* 3–5 cm long by 0.5–0.8 cm wide, shortly petiolate to 0.5 cm, narrowly elliptical, semi-terete, deeply sulcate, apex acute, lamina erect, straight to slightly curved, leathery, rigid. *Inflorescence* a dense raceme, to 16 cm long, upright-arching to descending, borne laterally from base of pseudobulb. *Flower* to 0.8 cm in diameter, numerous, simultaneous, resupinate, not spreading widely.

Range, elevation and habitat: *Bulbophyllum rupicola* is found in Brazil (Goiás, Serra do Caldas, Minas Gerais and São Paulo), where it grows as a lithophyte on rocks in exposed, sunny hot and dry conditions. It also grows, albeit rarely, as an epiphyte on mossy branches. This species blooms in October in nature. Details of its elevational range and conservation status are unknown.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern, using New Zealand *Sphagnum* moss, or pot in fine bark mix. *Temperature* intermediate. *Light* bright to bright diffused. *Watering* keep moist and well-drained, not wet, during growing season, and much drier during winter, when the roots should be misted occasionally (at least once per week or more). In the winter, this species can tolerate temperatures as low as 3 °C (36 °F), but it is probably best kept above 5 °C (40 °F). At these lower temperatures, ensure that the plant is dry. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, greatly reducing or halting the application of fertiliser during winter.

Comments: This species is uncommon to rare in cultivation, at least in the United States. There is very little information about it in the literature, but it is included here because of the beautiful, densely-clustered flowers and very attractive form of the plant. It is listed as *Bulbophyllum rupicolum* on Brazilian orchid sites. The plants seem to bloom in the late spring in cultivation. *Bulbophyllum rupicola* belongs in section *Micrantha*.



Figure 4.192 (above) The elegant inflorescence of *Bulbophyllum rupicola* (Grower: Mary Gerritsen).



Figure 4.193 (above) *Bulbophyllum rupicola* flowers usually open simultaneously (Grower: Mary Gerritsen).

BULBOPHYLLUM

Bulbophyllum scabratum Rchb.f. in W.G. Walpers

Publication: *Ann. Bot. Syst.* 6: 259 (1861)

Etymology: From the Latin *scabra* (rough or file like), referring to the surface of the petals and sepals.

Homotypic synonym: *Cirrhopetalum caespitosum* Wall. ex Lindl.

Heterotypic synonyms: *Bulbophyllum confertum* Hook.f., *Phyllorkis conferta* (Hook.f.) Kuntze.

Morphology: *Plant* 5–15 cm tall (occasionally slightly larger in cultivation), creeping, pseudobulbs closely set, branching. *Pseudobulbs* 0.7–2.2 cm tall by 1–1.5 cm wide, ovoid to conical, unifoliate, sheathed. *Leaf* 4–13 cm long by 0.6–2.5 cm wide, shortly petiolate, lanceolate to linear-lanceolate, apex acute to sub-acute, lamina suberect, softly leathery, dark green dorsal, pale underneath. *Inflorescence* umbellate raceme, subtending bract behind each flower, 2–7 cm long, suberect to descending, slender, often spotted with red, borne laterally from base of pseudobulb. *Flower* 0.6–1.5 cm long, 3–6 (to 10) in number, simultaneous, resupinate, lateral sepals connate basally, pointed apices diverging, flowers spreading, but the proportionately large, hooded, pointed, dorsal sepal and petals not spreading widely. Flower colour varies from light to creamy to greenish yellow, sometimes with a reddish overlay.

Range, elevation and habitat: *Bulbophyllum scabratum* grows as an epiphyte on tree trunks and as a lithophyte on mossy stones in open forest in Thailand, Vietnam, Nepal, northeast India (states of Assam, eastern Bengal and Sikkim) and Bhutan at elevations of 500–2000 m. This species blooms between March and June in nature and can be locally common.

Culture recommendations: *Substrate* mount on cork bark, hardwood, possibly tree fern, using New Zealand *Sphagnum* moss, or grow in pots or baskets using moss or fine bark mix. *Temperature* warm to intermediate. *Light* medium shade. *Watering* moist, well-drained, not wet. Best kept somewhat drier during winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: *Bulbophyllum scabratum* is not commonly seen in cultivation, but should be. This species has quite a distinctive range of sizes, but the smaller plant forms are definitely more appealing. The small, yellowish flowers, in an umbel of up to 10 flowers, have quite a large, hooded, pointed dorsal sepal. This member of the section *Cirrhopetalum* can bloom anytime from mid autumn to early spring in cultivation.



Figure 4.194 (above) Yellow *Bulbophyllum scabratum* flowers (Grower: Howard Gunn).



Figure 4.195 (above) A *Bulbophyllum scabratum* variant with greenish flowers (Grower: Tom Mudge).

BULBOPHYLLUM

Bulbophyllum schillerianum Rchb.f.

Publication: *Hamburger Garten-Blumenzeitung* 16: 423 (1860)

Etymology: Named in honour of Sigismund Schiller (1847–1920), Austro-Hungarian botanist and journalist.

Homotypic synonyms: *Oxysepala schilleriana* (Rchb.f.) D.L.Jones & M.A.Clem., *Diphyes schilleriana* (Rchb.f.) Szlach. & Rutk.

Heterotypic synonyms: *Bulbophyllum aurantiacum* F.Muell., *Dendrobium aurantiacum* (F.Muell.) F.Muell., *Phyllorkis aurantiaca* (F.Muell.) Kuntze, *Bulbophyllum aurantiacum* var. *wattsii* F.M.Bailey, *Oxysepala schilleriana* ssp. *maritima* D.L.Jones & M.A.Clem.

Morphology: *Plant* 2–10 cm long (individual growths), anchored at the base of the plant and pendulous in habit, especially as the plant ages and the rhizomes become longer, rooting at base, the roots often running back along the rhizome, forming clumps to 30 cm long, pseudobulbs well spaced to 2.5 cm apart along branching rhizome, rhizome covered in prominently veined papery sheaths. *Pseudobulb* very small, 0.5–0.8 cm tall by 0.3–0.4 cm wide, globular to ovoid to cylindrical, unifoliate. *Leaf* 2.5–10 cm long by 1–2.5 cm wide, sessile, short lanceolate to long oblong, apex acute, lamina shallowly sulcate, flat and thin to sub-terete to long, straight to curved, thick, succulent, minutely punctate. *Inflorescence* a raceme, often many simultaneous and sometimes obscuring rhizome, extremely short (0.3–0.4 cm), originating from fascicle along rhizome obscured by papery sheaths. *Flower* 0.3–0.7 cm long, 1–10 in number, simultaneous, resupinate, barely opening, campanulate, sepals thick, fleshy, blunt. This species varies considerably in its vegetative form.

Range, elevation and habitat: *Bulbophyllum schillerianum* has the widest distribution of any Australian *Bulbophyllum*. It ranges from just north of the Hunter River in central eastern New South Wales to just south of Cooktown in northern Queensland. A common species, it is found in a variety of habitats, growing as an epiphyte in mangroves, on trees in rainforest, on remnant trees in paddocks, in cloud forest, and as a lithophyte on boulders, rocky outcrops and cliff faces at higher elevations. In tropical regions it is usually found in areas with some elevation. It is often found near creeks and grows in both heavy shade and exposed situations.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood using New Zealand *Sphagnum* moss. Plants should be mounted due to the pendent nature of this species, which typically roots at the base. Not well suited to pot culture. *Temperature* intermediate to cool (cooler at night). This species can take close to freezing temperatures for short periods in the winter. *Light* bright diffused to medium shade. *Watering* moist, allow to dry between waterings, drier in winter. *Humidity* high. *Air movement* good.



Figure 4.196 (above) Inflorescence and leaves of *Bulbophyllum schillerianum* (Grower: Ron Parsons).



Figure 4.197 (above) *Bulbophyllum schillerianum* growing in *Eucalyptus* woodland at 400 m altitude, southeast Queensland, Australia (Photo: Gary Yong Gee).

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Comments: *Bulbophyllum schillerianum* has two recognised subspecies, ssp. *schillerianum* and ssp. *maritimum*; the latter is found in mangroves near the coast in temperate and tropical areas, whereas the nominate taxon is usually found at some altitude in tropical regions. They are commonly called Rope Orchids due to their pendent habit. This species blooms along the rhizome, and when blooming *en masse*, the flowers may actually obscure it entirely. Although some close relatives such as *Bulbophyllum lewisense* B.Gray & D.L.Jones and *Bulbophyllum gadgarrense* Rupp have a similar habit, this fashion of flowering is unusual for the genus. *Bulbophyllum schillerianum* blooms sporadically throughout the year; it, and its aforementioned relatives, all belong in section Oxysepala.



Figure 4.198 (above) The fleshy looking flowers of *Bulbophyllum schillerianum* may be produced in such profusion as to sometimes wholly obscure the rhizome (Grower: Ron Parsons).

BULBOPHYLLUM***Bulbophyllum setaceum*** T.P.Lin**Publication:** *Native Orchids Taiwan* 1: 55 (1975)**Etymology:** From the Latin *setae* (bristles), referring to the fringed dorsal sepals and petals.**Heterotypic synonyms:** *Bulbophyllum taitungianum* S.S.Ying, *Bulbophyllum ciliisepalum* T.C.Hsu & S.W.Chung, *Bulbophyllum lishanensis* Cheng.**Morphology:** *Plant* to 7.5 cm tall, pseudobulbs closely set to 1 cm apart along rhizome. *Pseudobulb* 1–1.3 cm long by 0.5–1 cm wide, ovoid to ellipsoid, rugose, ribbed, leaf apical, unifoliate. *Leaf* to 6 cm long by 2 cm wide, shortly petiolate, elliptic to oblong to ovate, apex obtuse to rounded, retuse, lamina suberect to spreading, slightly arcuate, fleshy, rigid, thickly leathery, slightly glossy, paler below. *Inflorescence* umbellate raceme, to 16 cm long, each flower subtended by long narrow bract, erect to descending, slender, borne laterally from base of pseudobulb. *Flower* to 7 cm long, to 16 or more in number, simultaneous, resupinate, sepaline tube campanulate, exterior of sepals minute pustulose, lateral sepals connate for approximately half of length with apices diverging, hooded dorsal sepal and petals proportionately small, white fringed, lip hinged. Flowers vary in colour from somewhat olive green to brownish green to orangey, colour being usually most prominent in the segments.**Range, elevation and habitat:** *Bulbophyllum setaceum* occurs in central Taiwan at elevations of 1500–2400 m, where it grows as an epiphyte on tree trunks in virgin broadleaf forest. The type specimen was found growing on the trunk of *Pinus taiwanensis* Hayata. This species blooms from March to May in nature and is locally common.**Culture recommendations:** *Substrate* mount on cork bark or rough barked hardwood, possibly tree fern, with New Zealand *Sphagnum* moss, or pot in moss or fine bark mix. *Temperature* intermediate to cool, but before growing under cool conditions, it is best to know the provenance of the plant. *Light* light shade to medium shade. *Watering* moist and well-drained, not wet. Best kept somewhat drier during winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed.**Comments:** One of the most beautiful species in section *Cirrhopetalum*, *Bulbophyllum setaceum* has numerous, proportionately long, narrow flowers with an intricate fringe of white hairs on the petals and sepals. These provide a lovely contrast against the brightly coloured orange to greenish segments. Though not commonly seen in collections, this rewarding species is well worth seeking out. It may be known as *Bulbophyllum lishanensis* in some collections. This species blooms in mid-spring to late summer in cultivation.**Figure 4.199 (above)** *Bulbophyllum setaceum* flower detail (Grower: Hanging Gardens).**Figure 4.200 (facing page, above)** The interesting, greenish flowers of *Bulbophyllum setaceum* (Grower: Golden Gate Orchids).**Figure 4.201 (facing page, below)** A brighter colour variant of the Taiwanese *Bulbophyllum setaceum* (Grower: Hanging Gardens).



BULBOPHYLLUM

Bulbophyllum shepherdii (F.Muell.) Rchb.f.

Publication: *Beitr. Syst. Pflanzenk.* 52 (1871)

Etymology: Named in honour of Thomas William Shepherd (1779–1835), proprietor of the Darling Nursery in Sydney, editor of the horticultural journal “Town & Country” and a collector of native flora, who discovered this species.

Homotypic synonyms: *Dendrobium shepherdii* F.Muell., *Phyllorkis shepherdii* (F.Muell.) Kuntze, *Oxysepala shepherdii* (F.Muell.) D.L.Jones & M.A.Clem.

Heterotypic synonyms: *Dendrobium crassulifolium* A.Cunn., *Dendrobium shepherdii* var. *platyphyllum* F.Muell., *Bulbophyllum crassulifolium* (A.Cunn.) Rupp.

Morphology: *Plant* to 4 cm long (individual growths), creeping, branching, forms large, dense mats, rhizome with dried bracts, roots along length, plant form depends on exposure, distance between pseudobulbs varies from closely set (barely discernible) to shortly spaced growths (to 0.8 cm) which alternate along rhizome. *Pseudobulbs* to 0.5 cm tall by 0.4 cm wide, globular to ovoid, cylindrical, tiny, unifoliate. *Leaf* 2–4 cm long by 0.8–0.9 cm wide, sessile, variably shaped according to illumination, from narrow-ovate to narrow-oblong, oblong or obovate, apex acute to rounded, lamina V-shaped to shallowly channelled on dorsal side, fleshy, succulent, leathery. *Inflorescence* a raceme, peduncle 0.5–0.9 cm long, scattered along rhizome. *Flower* 0.4–0.5 cm in diameter, single, resupinate, not spreading widely, campanulate.



Figure 4.202 (above) *Bulbophyllum shepherdii* growing epiphytically on a moss-covered trunk in mixed woodland consisting predominantly of Manna Gum (*Eucalyptus viminalis*), Sydney Blue Gum (*Eucalyptus saligna*) and Blackbutt (*Eucalyptus pilularis*) trees in New South Wales, Australia.

BULBOPHYLLUM

Range, elevation and habitat: *Bulbophyllum shepherdii* ranges from southeast Queensland to southeast New South Wales, at elevations of 5–1000 m. A widespread and common species, it is found in various habitats including coastal tablelands, rainforest, humid open forest, and particularly in moist areas in gorges and along streams where it grows on trees, rocks, boulders and rock faces amongst lichens and mosses. It occurs in deep shade to moderately bright situations and is often found growing with *Dendrobium gracilicaule*, *D. speciosum*, *D. linguiforme* and *D. schoeninum*, as well as *B. exiguum* and *B. elisae*. The main blooming period for this species is in the spring, although it may bloom sporadically throughout the rest of the year.

Culture recommendations: *Substrate* mount vertically on cork bark or hardwood using New Zealand *Sphagnum* moss, not on tree fern, and not well suited to pot culture. *Temperature* intermediate days, but can take cool temperatures at night. This species is cold tolerant, and can tolerate near freezing temperatures at night for short periods in winter. *Light* bright light to medium shade. *Watering* moist, dry slightly and briefly between waterings. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency and strength of fertiliser during winter.

Comments: A cute miniature, *Bulbophyllum shepherdii* is variable in both size and shape. The authors are quite partial to a smaller form that has diminutive, bullet-shaped leaves with a deep V-shaped wedge, an attractive plant to grow just for its foliage. The flowers of this species are relatively insignificant. A tough little orchid, *B. shepherdii* tolerates periods of drought by way of its succulent leaves. In cultivation, this member of section *Oxysepala* tends to bloom in the spring, but may also have flushes of flowers at other times of the year.

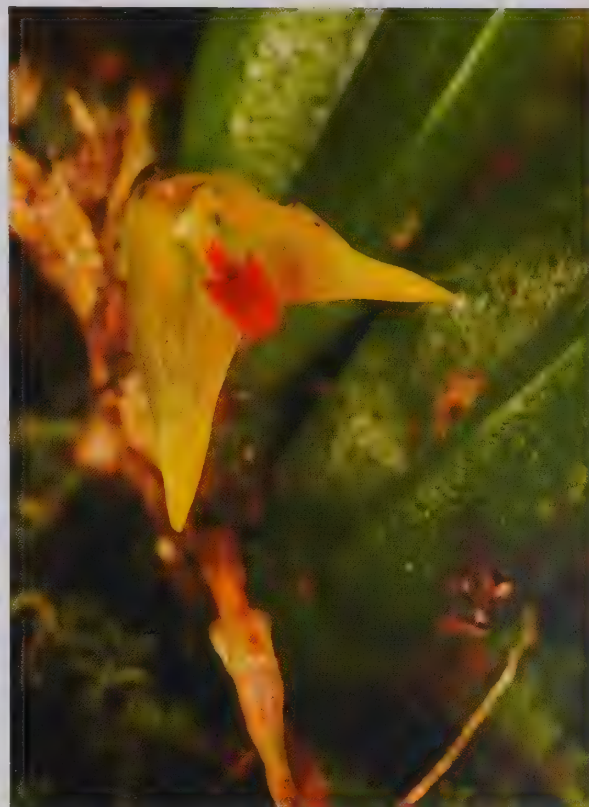


Figure 4.203 (above) The flower of *Bulbophyllum shepherdii* found *in situ* in New South Wales, Australia.



Figure 4.204 (above) *Bulbophyllum shepherdii* growths creeping through moss in New South Wales, Australia.

BULBOPHYLLUM

Bulbophyllum thaiorum J.J.Sm.

Publication: *Bull. Jard. Bot. Buitenzorg* II 8: 28 (1912)

Etymology: From Thai (Thailand) and *-orum*, a suffix designating a commemorative epithet; belonging to Thailand or the Thai people.

Homotypic synonyms: *Cirrhopetalum papillosum* Rolfe, *Bulbophyllum papillosum* (Rolfe) Seidenf. & Smitinand, nom. illeg. *Bulbophyllum thailandicum* Seidenf. & Smitinand, nom. illeg.

Morphology: *Plant* 5–15 cm tall, clumping to creeping, branching, pseudobulbs spaced to 2 cm apart along rhizome, erect. *Pseudobulb* to 2 cm tall by 1.8 cm wide, conical-ovoid, occasionally dorsally compressed, angular, rugose, enclosed in papery bracts at base, dark green to purple, leaf apical, unifoliate. *Leaf* to 11 cm long by 3 cm wide, shortly petiolate, conduplicate at base, narrowly oblong to elliptic-ovate, apex obtuse, lamina erect to suberect, leathery, dark green to purple above, reddish purple below. *Inflorescence* an umbellate raceme, 3–5 cm long, subtending bract behind each flower, erect to descending, slender, borne laterally from base of pseudobulb. *Flower* 2.5–3 cm long, to 13 in number, simultaneous, resupinate, lateral sepals papillose and connate entire length forming synsepal (minutely bilobate at apex), flower spreading but petals and dorsal sepal not spreading widely, campanulate, pedicellate ovaries faintly verrucose. The flower colour varies from solid yellow to yellowish orange, dark orange, red or bicoloured.

Range, elevation and habitat: *Bulbophyllum thaiorum* has been found in northern Myanmar, Thailand and Vietnam at elevations from 600–2600 m. In Thailand, it is found on trees in open jungle, and on mountain slopes and ridge tops at 1350–1370 m. In Vietnam it is found in Kon Tum Province at 2400–2600 m, where it is epiphytic on pine trees on ridge tops. It is not known when this species blooms in the wild. Conservation status unknown.

Culture recommendations: *Substrate* mount on flat cork bark using New Zealand *Sphagnum* moss, possibly also tree fern or potted. If potted, a shallow bulb pan or basket is best, using moss or fine bark to accommodate the somewhat rambling rhizome. *Temperature* intermediate to intermediate cool. *Light* bright diffuse to light shade. *Watering* keep moist and well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.

Comments: A delightful species in section *Cirrhopetalum*, *Bulbophyllum thaiorum* is not only appreciated for its flowers. The handsome plant is often entirely purple, with shapely, ribbed pseudobulbs that look like tiny, purple pumpkins. The contrasting, brilliantly coloured flowers are pleasingly arranged and held attractively away from the plant. When a well grown *B. thaiorum* reaches specimen size, it can produce many simultaneous inflorescences, a wondrous sight. There are plants in collections purchased as *B. yasnae*. This is an invalid name, and such plants are actually *B. thaiorum*. *Bulbophyllum thaiorum* blooms in mid-spring to early summer in cultivation.

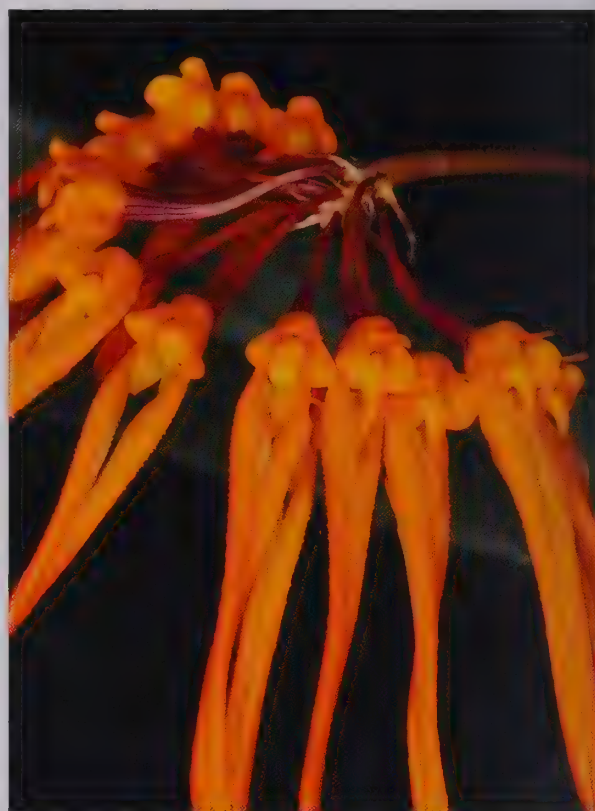


Figure 4.205 (above) The *Bulbophyllum thaiorum* plant (Grower: Marni Turkel).



Figure 4.206 (above) Reddish *Bulbophyllum thaiorum* flowers (Grower: White Oak Orchids).

Figure 4.207 (facing page) A pretty, two-toned variant of *Bulbophyllum thaiorum* (Grower: White Oak Orchids).



BULBOPHYLLUM***Bulbophyllum tripaleum* Seidenf.****Publication:** *Dansk Bot. Ark.* 33: 203 (1979)**Etymology:** From the Latin *tri* (three) and *paleae* (straw) referring to the three elongated paleae that hang from the sepals.**Homotypic synonym:** *Hordeanthos tripaleus* (Seidenf.) Szlach.

Morphology: *Plant* to 10 cm tall, creeping, branching, pseudobulbs closely set to spaced 1 cm apart along rhizome, deciduous during dry season when blooming occurs. *Pseudobulb* to 2.5 cm tall by up to 2 cm wide, conical to conical-ovoid, to nearly globose, squat, older bulbs often somewhat depressed, sheathed (white, degrading into a polygonal pattern), bifoliate, leaves growing during rainy season, deciduous. *Leaf* to 12 cm long by up to 2.7 cm wide, sessile, broadly lanceolate, apex acute to obtuse to rounded, lamina suberect to slightly spreading, fleshy, thinly leathery. *Inflorescence* a raceme with pendent rachis, flowers densely congested, peduncle ascending to erect, 3–6 cm long, borne from base of pseudobulb, appears after shedding of leaves. *Flower* 0.8 to 1 cm long including paleae, many in number, simultaneous, resupinate, nodding, barely open, sepals connate along length, barely open at aperture, petals and lip minute, hidden within sepals, bristly, palae to 4 cm long, hexagonal in cross section, pendent and banded.

Range, elevation and habitat: *Bulbophyllum tripaleum* is endemic to a very restricted range in northwest Thailand, where it grows in seasonal, deciduous forest at elevations to 1260 m. In nature, it blooms from January to February, the dry season. Conservation status unknown, but as a narrow endemic in a region where poaching occurs, it is likely to be of concern.

Culture recommendations: *Substrate* best mounted on cork using a little New Zealand *Sphagnum* moss, possibly in basket in moss or fine bark mix. Some growers have had great success growing this species on cedar plaques. *Temperature* warm to intermediate whilst growing, but may tolerate 4.5 °C (40 °F) during its winter rest. *Light* bright diffused to light shade. *Watering* moist yet well-drained when in leaf, much drier after leaves fall during the rest period, when roots should be misted occasionally to keep the plants from excessive desiccation. *Humidity* high while growing, average during rest. *Air movement* good. *Propagation* by division and seed. Fertilise at 1/4 to 1/2 strength weekly during active growth, but omit during dormancy.

Comments: *Bulbophyllum tripaleum* has intricate, attractive flowers with curious, banded paleae that dance with the slightest breeze. Quite rare in cultivation, it is closely related to *B. lemniscatoides* and *B. lemniscatum*; all three species belong in section *Lemniscata*, although some botanists include them in section *Pleiophyllus*. For success with *B. tripaleum*, the cultural requirements must be closely followed. In cultivation it blooms in spring.



Figure 4.208 (above) *Bulbophyllum tripaleum* flowers displaying their banded paleae (Grower: Andy's Orchids).



Figure 4.209 (above) The densely flowered inflorescence of *Bulbophyllum tripaleum* (Grower: Andy's Orchids).

BULBOPHYLLUM

Bulbophyllum wallichii Rchb.f. in W.G. Walpers

Publication: *Ann. Bot. Syst.* 6: 259 (1861)

Etymology: Named after its original collector, Nathaniel Wallich (1786–1854), a Danish surgeon, botanist and author who collected widely in India and southeast Asia.

Homotypic synonyms: *Cirrhopetalum wallichii* Lindl. (nom. illeg), *Tripudianthes wallichii* (Rchb.f.) Szlach. & Kras.

Heterotypic synonyms: *Bulbophyllum refractoides* Seidenf.

Morphology: Plant to 12 cm, creeping, branching, pseudobulbs closely set. *Pseudobulb* to 2.5 cm tall by up to 1.2 cm wide, conical to pyriform, wrinkled when in bloom, orangey-yellow in high light, leaves 2, appearing after inflorescence withers, deciduous. *Leaf* to 12 cm long by up to 2.5 cm wide, sessile to shortly petiolate, narrowly oblong, apex acute to subacute, lamina erect, somewhat spreading towards apex, fleshy. *Inflorescence* a raceme, flowers loosely arranged, peduncle to 25 cm long (including raceme to 8.5 cm long), inflorescence erect to horizontal but rachis pendent, arising from base of pseudobulb. *Flower* 3.4–5 cm long, to ten in number, simultaneous, spreading to nodding, fragrant.

Range, elevation and habitat: *Bulbophyllum wallichii* has been found in Bhutan, China (south and west Yunnan province), India (Sikkim to NE Himalayas), Myanmar, Nepal, Thailand, Cambodia and Vietnam, where it grows on tree trunks and occasionally on vertical granite bluffs, often on the lower reaches amongst mosses and lichens. It occurs in seasonally-wet montane forest, at elevations of 1000–2200 m. This species is uncommon in India; its conservation status in the remainder of its range is not known. It blooms in nature from March to April in China and Vietnam, and from September to November in India.

Culture recommendations: *Substrate* best mounted on cork using a little New Zealand *Sphagnum* moss, possibly in a basket in moss or fine bark mix. Some growers have had great success growing this species on cedar plaques. *Temperature* warm to intermediate whilst growing, but may tolerate lows of 4.5 °C (40 °F) during its winter rest. *Light* bright diffused to light shade. *Watering* moist yet well-drained when in leaf, much drier after leaves fall during its rest period, with only occasional misting of the roots to prevent over-desiccation. *Humidity* high while growing, average during rest. *Air movement* good. *Propagation* by division and seed.

Comments: A curious species, with a scape that emerges erect from the base of a leafless pseudobulb, and with a nodding raceme of propeller-shaped, tangerine coloured flowers. The anatomy of the individual flowers resemble those of section *Cirrhopetalum*, a former, albeit illegitimate generic name for this species, but the arrangement of the flowers differs; rather than an umbel, the flowers are dispersed in a lax arrangement on



Figure 4.210 (above) *Bulbophyllum wallichii* in a *Quercus* forest at 1600 m, central Nepal (Photo: Bhakta Bahadur Raskoti).



Figure 4.211 (above) *Bulbophyllum wallichii* growing epiphytically in Vietnam (Photo: Leonid Averyanov).

BULBOPHYLLUM

the pendent portion of the inflorescence. This species is closely related to *B. refractum* and *B. kanburiense*; all three species belong in section *Tripudianthes*. To be successful with this species, the culture requirements need to be strictly followed. This species has been seen blooming in cultivation in the late winter.



Figure 4.212 (above) The striking flowers of the closely related *Bulbophyllum refractum* (Grower: Andy's Orchids).
Figure 4.213 (facing page) The beautiful, pendent inflorescence of *Bulbophyllum kanburiense* (Grower: Marni Turkel).



BULBOPHYLLUM

Bulbophyllum weinthalii R.S.Rogers

Publication: *Trans. & Proc. Roy. Soc. South Australia* 57: 95 (1933)

Etymology: Named for F. August Weinthal (Australia), who collected this species.

Homotypic synonyms: *Adelopetalum weinthalii* (R.S.Rogers) D.L.Jones & M.A.Clem, *Spilorchis weinthalii* (R.S.Rogers) D.L.Jones & M.A.Clem.

Morphology: Plant 2.5–5 cm tall, creeping, branching, densely clumping, pseudobulbs clustered, rooting prolifically from base, roots fine. *Pseudobulb* 1–2 cm tall by 0.9–1.5 cm wide, ovoid to conico-ovoid, irregularly furrowed, enclosed in whitish, fibrous semi-persistent sheaths, leaf apical, unifoliate. *Leaf* 2–3 cm long by 0.5–0.9 cm wide, shortly petiolate, narrowly oblong to elliptic, apex acute to obtuse, lamina erect to spreading, leathery, rigid. *Inflorescence* a raceme, peduncle to 2 cm long, erect to suberect, borne laterally from base of pseudobulb. *Flower* to 2 cm wide, rarely larger, proportionately large, single, resupinate, spreading, campanulate, lip thick, fleshy with dorsal channel, not hinged. Markings on flowers vary in size, density and form, from spots to stripes.

Range, elevation and habitat: *Bulbophyllum weinthalii* is endemic to eastern Australia (southeast Queensland to northeast New South Wales). This species grows as an epiphyte on the lichen and moss festooned upper trunks and main lateral branches of trees, including the Hoop Pine (*Araucaria cunninghamii*), in subtropical to warm temperate rainforest at elevations of 650–1200 m. It tends to colonise certain individuals. In these regions, it is subject to frequent fog and mist, as well as rain. This species may very rarely grow on rocks (Mike Harrison, pers. comms.). It is a locally common species, although its usual position high on trees means that it is seldom encountered in nature, and usually on fallen branches if so. Often found growing with *B. globuliforme*, and occasionally *B. argyropus*, *B. weinthalii* blooms in the autumn to early winter in nature.

Culture recommendations: *Substrate* mounted on a horizontal raft of tree fern, cork bark or rough-barked hardwood. Not suited to potted culture. *Temperature* intermediate with cooler nights. It tolerates to near freezing temperatures for brief periods in the winter. *Light* bright diffuse. *Watering* moist, but dry briefly between waterings. *Humidity* high. *Air movement* brisk to strong.

Comments: This is one of the most interesting and handsome of the Australian *Bulbophyllum* species, having proportionately large flowers that are similar to the species in section *Sestochilus*. There are two recognised subspecies; *ssp. weinthalii* and *ssp. striatum*. The flowers of the former, which is found in southeast Queensland to New South Wales (in the Bunya mountains to Dorrigo), are spotted. In contrast, the colour on the flowers of *ssp. striatum* commonly coalesce into stripes; it also has slightly wider segments and occurs in a highly localised area (Dawes Range and Kroombit Tops, Queensland) about 500 km north of the nominate form. This species is considered difficult to grow even in its native Australia, though *B. weinthalii* *ssp. striatum* is reported to be somewhat easier to maintain. Considered to belong to its own genus, *Spilorchis*, by Australian botanists M. Clements and D. Jones, *B. weinthalii* has the unusual feature of an immobile lip. Even though the lip is not classically hinged, it is quite probable that the lip can be pushed down by the pollinator. This species has been classified in section *Adelopetalum*. This species is very rarely seen outside of Australia in cultivation, and it is uncommon in collections even in its native country.

Figure 4.214 (facing page, above) A pair of *Bulbophyllum weinthalii* *ssp. striatum* flowers. This taxon is native to eastern Australia (Grower: J & L Orchids).

Figure 4.215 (facing page, below) A *Bulbophyllum weinthalii* *ssp. striatum* bloom. The fibrous sheath that often partly covers the pseudobulbs is apparent in the background (Grower: J & L Orchids).



BULBOPHYLLUM

Bulbophyllum wendlandianum (Kraenzl.) Dammer

Publication: *Orchis* 1: 87 (1907)

Etymology: Named for Hermann A. Wendland (1825–1903), Director of the Berggarten of Herrenhausen, Hanover, Germany, who collected it in Mexico in the 19th century.

Homotypic synonym: *Cirrhopetalum wendlandianum* Kraenzl.

Heterotypic synonyms: *Cirrhopetalum collettianum* Collett & Hemsl., *Cirrhopetalum collettii* Hemsl., *Phyllorkis collettii* (Hemsl.) Kuntze, *Cirrhopetalum proliferum* Rolfe.

Morphology: *Plant* to 13 cm (rarely larger), creeping, branching, pseudobulbs spaced to 4 cm apart along rhizome, rooting from base of pseudobulb. *Pseudobulb* to 3.5 cm long by up to 3 cm wide, ovoid to conical ovoid, tetragonal to multi-angular, unifoliate, slightly glossy, yellow green. *Leaf* to 9.5 cm long by up to 3.2 cm wide, subpetiolate, elliptic-oblong, apex obtuse, lamina erect, stiff, leathery, thick, rigid, minutely rugose. *Inflorescence* umbellate raceme, 7–15 cm long, peduncle rigid, lateral from new growth. *Flower* to 16.5 cm long, to 7 in number, simultaneous, resupinate, spreading widely but dorsal sepal and petals fringed with paleae.

Range, elevation and habitat: *Bulbophyllum wendlandianum* occurs in China (Yunnan province), northern Myanmar and northern Thailand at elevations of 200–2000 m. Locally common, it grows lithophytically on rocks and epiphytically on trees at forest margins. In nature, this species blooms in late spring to early summer (May, June and July in Thailand).

Culture recommendations: *Substrate* mount using cork bark or rough-barked hardwood, possibly tree fern, using New Zealand *Sphagnum* moss, or grow in a shallow pot or basket using moss or fine bark mix. *Temperature* warm to intermediate-cool; tolerates cooler temperatures during the winter, but best kept above 12 °C, (~54 °F). It is cultivated outside in shade houses in the area of Sydney, Australia, and regularly survives temperatures close to freezing during the winter. *Light* bright diffused. *Watering* keep moist and well-drained, not wet during growing period; somewhat drier during winter. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.



Figure 4.216 (above) *Bulbophyllum wendlandianum* flower detail (Grower: Hanging Gardens).

BULBOPHYLLUM

Comments: This member of section *Cirrhopetalum* is a handsome plant that carries beautiful pinwheels of large flowers. These bear marvellous little tufts of brightly coloured paleae at the ends of their petals and along the upper margins of the vibrantly striped dorsal sepal. The mobile paleae flutter with any air movement. Unusually for the genus, the inflorescence is borne along the side of a new growth. Occasionally seen in collections as *Cirrhopetalum collettii*, a synonym, this species is easy to grow and blooms in the spring in cultivation.



Figure 4.217 (above) The beautiful, elegant blooms of *Bulbophyllum wendlandianum* (Grower: John Leathers & Bob Hamilton).

Caluera Dodson & Determann

Publication: Dodson, C. H., & R. O. Determann, 1983, *Amer. Orchid Soc. Bull.* 52: 375

Subfamily: Epidendroideae

Tribe: Maxillariaeae

Subtribe: Oncidiinae (formerly *Ornithocephalinae*)

Type species: *Caluera surinamensis* Dodson & Determann, 1983, *Amer. Orchid Soc. Bull.* 52: 377.

Etymology: Named for Carlyle August Luer (1922-) American orchid enthusiast and expert on North American native orchids as well as the Pleurothallidinae. Luer has named and described thousands of species and multiple genera in this subtribe.

Profile: A genus of three species from Ecuador, French Guiana, Suriname, Venezuela and northern Brazil, found at lower elevations (300–600 m) in deep shade in wet and scrub forests.

General plant morphology: Miniature, epiphytic, fan shaped, stems short, leaves alternate, distichous. *Leaf* bilaterally compressed. *Inflorescence* umbellate raceme, erect. *Flower* erect, facing upward and inward, sepals and petals subsimilar, free, spreading, lip unlobed, sessile with basal callus, column erect, without wings or foot, pollinia 4, on common stipe and minute viscidium.



Figure 4.218 (above) The spotted blooms of *Caluera vulpina* growing in cultivation (Photo: Karl Senghas, courtesy of the Swiss Orchid Foundation).

CALUERA

Caluera vulpina Dodson & Determann

Publication: *Amer. Orchid Soc. Bull.* 52: 375 (1983)

Etymology: From the Latin *vulpine* (fox-like), referring to Fred Fuchs of Naranja, Florida, who first brought the plant to the attention of the authors; the surname Fuchs means fox in German.

Morphology: *Plant* 2–2.5 cm tall, occasionally branching, fan shaped, erect. *Pseudobulb* minute, stem very short, enclosed by fleshy, deeply imbricate, distichous leafy bracts, 1–6 in number, leaf apical, unifoliate, eventually deciduous. *Leaf* to 2.5 cm long, shortly petiolate, obovate to narrowly oblong, apex obtuse to acute, sometimes apiculate, lamina erect, equitant, leathery, marginate, edges sometimes suffused with red or purple. *Inflorescence* a verticillate umbellate raceme, to 2 cm long, flowers subtended by prominent greenish to reddish bracts, axillary between bracts. *Flower* 0.6–0.8 cm long, usually 4 (occasionally 3 or 5) in number, simultaneous, resupinate, widely spreading, all flowers facing inwards and upwards.

Range, elevation and habitat: This rare species occurs in Ecuador (province of Napo) at 300–450 m, where it grows as an epiphyte on smaller branches and small trees, embedded in moss in tropical wet forests. It has also been found on spiny trees in scrub forest in the Cordillera del Condor (Morona-Santiago province) at 600–900 m (Dan Newman, Hanging Gardens, pers. comms., 2011). It is also on a list of species occurring in Colombia (<http://orquideasbogotaabo.com>), and there are collection records from Bolivia. There are additional collections from Brazil and French Guiana, but these are likely to be the similar species, *Caluera surinamensis*, which occurs in those countries. *Caluera vulpina* flowers from April to May in nature.

Culture recommendations: *Substrate* mount on cork bark or hardwood, possibly tree fern, using a little New Zealand *Sphagnum* moss, or potted in small pots using moss or well draining fine bark mix. *Temperature* warm to warm-intermediate. *Light* bright shade. *Watering* moist, well drained, drying slightly between waterings. *Humidity* high. *Air movement* good. *Propagation* seed, possibly by division. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Caluera vulpina* has a very unusual arrangement of flowers for an orchid. There are nearly always four blooms, each with a prominently large column, arranged in a whorl, facing upwards and inwards, in the pattern of a cross. Exceedingly rare in cultivation and seen on only two occasions by the authors, the propagation of this species by current growers should be strongly encouraged so as to increase its prevalence in cultivation.

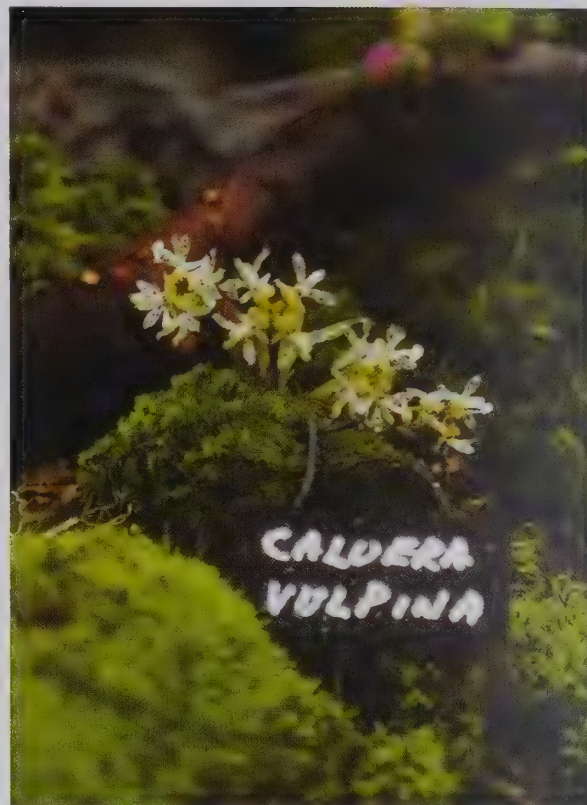


Figure 4.219 (above) *Caluera vulpina* photographed at the New York Orchid Show (Grower: Ann & Phil Jesup).



Figure 4.220 (above) *Caluera vulpina* leaves and flower buds (Photo: Karl Senghas, courtesy of the Swiss Orchid Foundation).



Figure 4.221 The characteristic floral arrangement of *Caluera vulpina* is clearly apparent (Grower: Ann & Phil Jesup).

Campanulorchis Brieger

Publication: Brieger, F. G., 1981, *Schlechter Orchideen* 1(11–12): 750

Subfamily: Epidendroideae
Tribe: Podochileae
Subtribe: Eriinae

Type species: *Campanulorchis globifera* (Rolfe) Brieger, F. G., 1981, *Schlechter Orchideen* 1(11–12): 750.

Etymology: From the Latin *campanula* (small bell) and *orchis* (orchid) referring to the flowers.

Profile: A genus of 5 epiphytic sympodial species widespread in Indonesia, Laos, Malaysia, New Guinea, Thailand and Vietnam, and extending northeast to Hainan Island (China).

General plant morphology: Small to medium sized, roots pubescent. *Pseudobulbs* 1 internode, smallish to medium, clustered to repent, basically globose, or swollen at base, tapering distally, often with rusty-brown pubescent sheaths, leaves 1–4 in number at apex. *Leaf* linear-oblong or ligulate, conduplicate to terete, leathery, erect or spreading, sometimes pubescent leaf base. *Inflorescence* a raceme, to 3 per pseudobulb, often densely pubescent, ferrugineous, floral bracts also often ferrugineous pubescent, emerging from acute sheath. *Flowers* 1 to few, resupinate or non-resupinate, opening widely, densely pubescent, dorsal sepal free, lateral sepals connate with column foot forming a shortly conic mentum, petals free, smaller than sepals, glabrous, lip entire or three-lobed, column short, sometimes clavate, sometimes pubescent, pollinia 8. This genus was recently separated from *Eria*.



Figure 4.222 (above) The fine bloom of the type species, *Campanulorchis globifera*, seen here in cultivation (Grower: Hanging Gardens).

CAMPANULORCHIS

Campanulorchis pelliipes (Rchb.f. ex Hook.f.) Y.P.Ng & P.J.Cribb

Publication: *Orchid Rev.* 113: 272 (2005)

Etymology: From the Latin *pellis* (skin, hide), and *pes* (foot) referring to the pubescent column foot.

Homotypic synonyms: *Eria pelliipes* Rchb.f. ex Hook.f., *Pinalia pelliipes* (Rchb.f. ex Hook.f.) Kuntz.

Heterotypic synonyms: *Eria teretifolia* Griff., nom. illeg. *Eria jacobsonii* J.J.Sm., *Eria taluensis* J.J.Sm.

Morphology: Plant 6–15 cm tall (rarely slightly taller), creeping, branching, clustered. *Pseudobulb* to 2 cm tall by up to 2 cm wide, ovoid to globose, erect to ascending, sheathed in pubescent bracts, unifoliate. *Leaf* to 13 cm long (occasionally slightly longer) by up to 0.5 cm wide (to 1 cm at base), tapering towards apex, terete, sulcate on dorsal side near base, apex acute to obtuse, lamina erect to ascending, leathery. *Inflorescence* a raceme, to 5 cm long (peduncle 2–3 cm), with basal sheath to 2.5 cm long, ascending, erect, slender, pubescent, borne at apex of pseudobulb. *Flower* 1.2–1.5 (occasionally to 1.8) cm wide, 1–3 in number, resupinate, spreading, sparsely pubescent inside and along margin, generally pale yellow in colour. Flowers vary in width of segments, lip colour and shape of lip apex.

Range, elevation and habitat: *Campanulorchis pelliipes* is a common epiphyte, and occurs in Peninsular Malaysia, Thailand (peninsular), Borneo, and possibly Sumatra. It is known from elevations between 10–1500 m in the lowlands, hill forests and lower montane mossy forests, often in very exposed situations (where it is much dwarfed).

Culture recommendations: *Substrate* mount on cork bark or hardwood using New Zealand *Sphagnum* moss, or in pots or in baskets using moss or fine bark mix. *Temperature* warm to intermediate. *Light* bright to bright shade. *Watering* moist, drying slightly between waterings, keep slightly drier in winter. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, reducing frequency in winter.

Comments: Attractive for the plant alone, *Campanulorchis pelliipes* has long terete leaves and relatively small, pubescent pseudobulbs that tend to grow in rows. Another lovely feature is the erect to upwardly arching pubescent inflorescence, which bears cute, small, dorsally pubescent flowers. This species was once considered to be in the genus *Eria*, section *Strongylaria*. It blooms in cultivation from early to mid autumn.



Figure 4.223 (above) The bloom of *Campanulorchis pelliipes* (Grower: Ron Parsons).

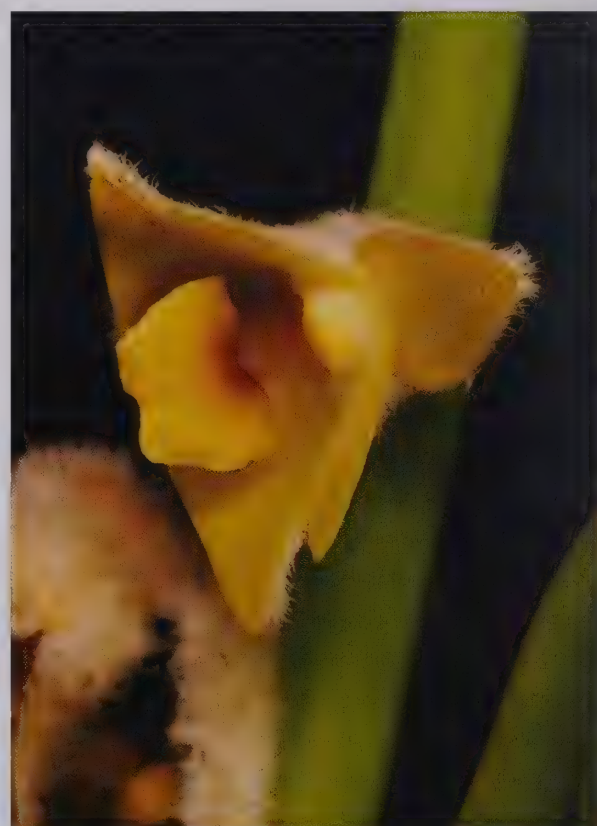


Figure 4.224 (above) A different colour form of *Campanulorchis pelliipes* (Photo: Gary Yong Gee).

Campylocentrum Benth.

Publication: Benth, J., 1881, *J. Linn. Soc., Bot.* 18: 337

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Angraecinae

Type species: *Campylocentrum micranthum* (Lindl.) Rolfe, 1901, *Orchid Rev.* 9: 136.

Etymology: From the Greek *kampylos* (crooked) and *kentron* (spur), a reference to the form of the nectary.

Heterotypic synonyms: *Todaroa* A.Rich. & Galeotti, *Ann. Sci. Nat., Bot.*, (nom illeg); *Campylocentron* Benth., *J. Linn. Soc.* 9 (orth. var.)

Profile: A genus of about 60 species, widespread through much of the tropical Americas.

General plant morphology: Monopodial, epiphytic, stems long or very short, with or without leaves, leafless species with roots containing chlorophyll, being therefore capable of photosynthesis. *Inflorescence* loosely or densely flowered, few to many in number, unbranched, short. *Flowers* small, few to many in number, sepals and petals free, subsimilar, lip entire or trilobed, column short, pollinia 2. This is one of two genera of Angraecinae in tropical America, the remainder being distributed throughout Madagascar and tropical Africa, as well as on the Mascarene and Comoros Islands.



Figure 4.225 (above) *Campylocentrum grisebachii*, a species closely related to *C. fasciola*, growing epiphytically in Brazil (Photo: Rafael Bortoloti).

CAMPYLOCENTRUM

Campylocentrum fasciola (Lindl.) Cogn.

Publication: *Fl. Bras.* 3(6): 520 (1906)

Etymology: From the Latin *fasciolus* (tape, small bandage), possibly referring to the roots.

Homotypic synonyms: *Angraecum fasciola* Lindl., *Aeranthus fascicola* (Lindl.) Rchb.f.

Heterotypic synonyms: *Angraecum weigeltii* Rchb.f., *Campylocentrum sullivanii* Fawc. & Rendle, *Campylocentrum loretoense* Schltr., *Campylocentrum lankesteri* Ames.

Morphology: Plant leafless, stem abbreviated, roots photosynthetic, abundant, radiating from a central growth point, relatively thick, eventually to 30 cm long (in nature) by 0.2 cm wide. *Inflorescence* a densely flowered raceme, 1 to several simultaneous inflorescences to 15 cm long, flowers distichous, spaced evenly, each flower subtended by persistent concave bracts, peduncle to 2.6 cm (rachis much longer) long, suberect to descending, slender, from central meristem. *Flower* 0.2–0.3 cm in diameter, many (to 30+) in number, resupinate, spreading, nectary short thick, saccate, subcylindric.

Range, elevation and habitat: *Campylocentrum fasciola* is extremely widespread in tropical America, occurring in Mexico (states of Chiapas and Quintana Roo), Guatemala (departments of Izabal and Petén), Belize (districts of Stann Creek and Toledo), Honduras (department of Cortés), Nicaragua (department of Atlántico Norte), Costa Rica (provinces of Heredia and Puntarenas), Panama (Canal Area and provinces of Panamá and Darién), Venezuela (states of Amazonas, Apure, Bolívar, Delta Amacuro and Miranda), Guyana, French Guiana, Brazil (phytogeographic domain of Amazônia, states of Amazonas, Mato Grosso and Pará), Ecuador (provinces of Cañar, Los Ríos, Morona-Santiago, Napo and Sucumbíos), Peru (departments of Cuzco and Loreto) and Bolivia (departments of Chuquisaca and Tarija), and some of the Caribbean islands. It is found over a fairly broad elevation range, from sea level to 2000 m. A twig epiphyte, this species is found in tropical wet lowland forests, wet montane forests and in light forests on swampy ground, where it grows on twigs and lianas, sometimes hanging by only a few roots. It can be quite common on cultivated plants (e.g. coffee, citrus, cocoa). This species blooms periodically throughout the year in nature.

Culture recommendations: *Substrate* best mounted on cork bark, wood plaques or rough-barked hardwood, not suited to pot culture; baskets with no media may succeed with adequate watering and high humidity. *Temperature* warm to intermediate. *Light* bright shade to medium shade. *Watering* frequent, but drying briefly between waterings. Care is needed to avoid under or over-watering. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 strength weekly.



Figure 4.226 (above) The flowers and leafless growths of *Campylocentrum fasciola* (Grower: Marni Turkel).



Figure 4.227 (above) Inflorescence detail of *Campylocentrum fasciola* (Grower: Marni Turkel).

CAMPYLOCENTRUM

Comments: A fantastic miniature, potentially with several simultaneous inflorescences each bearing many flowers. *Campylocentrum fasciola* is not commonly seen in cultivation. One of a number of leafless species in the genus, it can be delicate, particularly if plants are kept dry for too long or over-watered. The only plants observed in bloom by the authors were in late winter. A twig epiphyte in nature, growers may find this species relatively short-lived.



Figure 4.228 (above) The flowers of *Campylocentrum grisebachii*, a close relative of *C. fasciola* (Grower: Russ Varnado).

Capanemia Barb.Rodr.

Publication: Barbosa Rodrigues, J., 1877, *Gen. Spec. Orchid.* 1: 137

Subfamily: Epidendroideae
Tribe: Maxillariae
Subtribe: Oncidiinae

Type species: *Capanemia superflua* (Rchb.f.) Garay, 1967, *Bot. Mus. Leaf.* 21: 261.

Etymology: Named for Dr. Guillermo Schuch de Capanema, a Brazilian geologist and naturalist of the 19th century.

Profile: A genus of approximately 10 species native to Brazil, Bolivia, Argentina, Paraguay and Uruguay.

General plant morphology: Epiphytic, sympodial, small to minute, densely clumping. *Pseudobulb* small, unifoliate, subtended by small papery bracts, leaves 1, sometimes 2. *Leaf* flat or terete. *Inflorescence* two to many-flowered raceme, shorter than or equal in length to the leaves, floral bracts minute. *Flowers* shallowly campanulate, sepals and petals free, subsimilar, lip similar, unlobed, with or without callus, column short without foot, large parallel column wings flanking the rostellum, pollinia 2, elongated common stipe and minute viscidium.



Figure 4.229 (above) Mass blooms of *Capanemia superflua* make for a wonderful display (Photo: Marcos Compacci).

CAPANEMIA

Capanemia micromera Barb.Rodr.

Publication: *Gen. Spec. Orchid.* 1: 138 (1877)

Etymology: From the Greek *micro* (small) and *mera* (parts, divisions), possibly referring to the small segments of the flower.

Homotypic synonym: *Quekettia micromera* (Barb.Rodr.) Cogn.

Heterotypic synonyms: *Quekettia micromera* var. *major* Cogn., *Quekettia australis* Kraenzl., *Capanemia perpusilla* Schltr., *Quekettia microscopica* var. *naboulettiana* Hauman, *Capanemia australis* (Kraenzl.) Schltr., *Capanemia angustilabia* Schltr., *Capanemia spathuliglossa* Pabst, *Capanemia riograndensis* Pabst, *Capanemia lossiana* L.Kollmann.

Morphology: Plant 1.5–3 cm tall, pseudobulbs densely clumping, much branched, slowly creeping, erect. *Pseudobulb* 0.3–0.4 cm tall by 0.2–0.3 cm wide, ovoid to obovoid to globose, partially enclosed in papery sheaths, leaf apical, 1–2 in number. *Leaf* 1.5–2.5 cm long by 0.10–0.15 cm wide, narrowly linear, attenuate, apex acute, sulcate dorsally, subterete, erect, leathery, slightly flexible, punctate, often suffused with reddish purple. *Inflorescence* a raceme, to 1.5 cm long, shorter than leaves, erect to suberect, lateral. *Flower* 0.2 cm wide, 1–2 in number, simultaneous, resupinate, spreading and campanulate to widely spreading, sometimes upwards facing.

Range, elevation and habitat: An epiphytic species, *Capanemia micromera* grows in Brazil (states of Tarija, Minas Gerais, São Paulo, Rio de Janeiro, Paraná, Santa Catarina, and Rio Grande do Sul), Argentina (province of Misiones), Paraguay (province of San Pedro) and Bolivia (departments of Chuquisaca and Tarija). It occurs in warm, humid lowlands and cool moist mountains at 150–2100 m, where fog and high humidity abound at night. It also grows on trees on the interior plains and savannahs where it can be locally abundant. This species blooms June to September in nature.

Culture recommendations: *Substrate* probably best mounted on cork bark or rough-barked hardwood with a little New Zealand *Sphagnum* moss; may succeed in very small pots using moss or fine bark mix. *Temperature* warm to intermediate days, but tolerates cooler nights to 10 °C (50 °F). *Light* bright diffused. *Watering* frequent, drying briefly between waterings; reduce frequency of watering in winter. *Humidity* high. *Air movement* good. *Propagation* by division or by seed. *Fertilise* at 1/4 weekly, reducing frequency in winter.

Comments: A hand lens might be needed to truly appreciate the flowers of this true miniature! This delightful little plant has very lightly-scented and surprisingly long-lived blooms, lasting up to 8 weeks in excellent condition. Whilst not rare, this species is not commonly seen in cultivation and makes for an excellent choice for those who love tiny plants. It tends to bloom in early autumn to early winter in cultivation.



Figure 4.230 (above) The tiny plants and flowers of *Capanemia micromera* (Grower: Ron Parsons).



Figure 4.231 (above) *Capanemia micromera* blooms in detail (Grower: Ron Parsons).

CAPANEMIA

Capanemia superflua (Rchb.f.) Garay

Publication: *Bot. Mus. Leagl.* 21: 261 (1967)

Etymology: From the Latin *superfluous* (rich, luxurious) referring to the many fine flowers.

Homotypic synonym: *Oncidium superfluum* Rchb.f. in W.G. Walpers.

Heterotypic synonyms: *Capanemia uliginosa* Barb.Rodr., *Rodriguezia anomala* Rolfe, *Rodriguezia juergensiana* Kraenzl., *Rodriguezia uliginosa* (Barb. Rodr.) Cogn. *Capanemia juergensiana* (Kraenzl.) Schltr.

Morphology: *Plant* to 10 (occasionally to 13) cm tall, pseudobulbs densely clumping, much branching, slowly creeping, erect. *Pseudobulb* to 3 cm tall by up to 0.5 cm wide, elongate, cylindrical to narrowly conical, slender, enclosed in whitish papery sheaths, leaf apical, enclosed in bracts, unifoliate (occasionally smaller second leaf). *Leaf* to 10 cm long by 0.5 cm wide, sessile, narrowly linear, apex acute, sulcate dorsally, subterete, erect, leathery, slightly flexible. *Inflorescence* a raceme, 4–10 cm long, flowers sub-secund, erect to descending, lateral. *Flower* 0.6–0.8 cm in diameter, several to many in number, simultaneous, resupinate, widely spreading, proportionately large lip, fragrant.

Range, elevation and habitat: *Capanemia superflua* grows in the Mata Atlântica phytogeographic region of Brazil (states of Minas Gerais, Espírito Santo, São Paulo, Rio de Janeiro, Paraná, Santa Catarina, and Rio Grande do Sul) and Argentina (province of Misiones). This occasional to abundant epiphyte is found from 500–750+ m. It grows in a variety of habitats that include hot and dry lowland forests, moist, often foggy, coastal mountain forest, slender branches in moist montane forest, riparian forest, and stunted swamp forest. This species blooms in spring to summer in nature.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern, using little or no New Zealand *Sphagnum* moss. It may also be potted in small pots or baskets using fine bark mix. *Temperature* intermediate. *Light* bright diffused to bright shade. *Watering* frequent, drying briefly between waterings; slightly drier in the winter. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: This highly collectible species is atypical for the *Oncidium* Alliance with its terete leaves and diminutive, narrowly conical bulb. Particularly attractive when grown on a mount, a vigorously flowering plant with its gracefully descending spikes can put on an amazing display. This species is surprisingly fragrant. *Capanemia superflua* is the largest species in the genus and was, for many years, available under the synonym *Capanemia uliginosa*, a name still maintained in some collections. This species generally blooms in the mid to late spring in cultivation.



Figure 4.232 (above) The flowers of *Capanemia superflua* (Grower: Judy Carney).



Figure 4.233 (above) A profusion of *Capanemia superflua* blooms (Photo: Marcos Compacci).



Figure 4.234 (above) Epiphytic growths of *Capanemia superflua* in the wild (Photo: Marcelo Pedron).

Figure 4.235 (below) A specimen plant of *Capanemia superflua* growing in a basket (Photo: Marcos Compacci).

Cattleya Lindl.

Publication: Lindley, J., 1824, *Coll. Bot.*: t. 33

Subfamily: Epidendroideae

Tribe: Epidendreae

Subtribe: Laeliinae

Type species: *Cattleya labiata* Lindl., 1824, *Coll. Bot.*: t. 33.

Etymology: Named for Sir William Cattley (1788–1835), British collector of orchids, ferns and other tropicals, who was the first to flower *Cattleya labiata*, the type species of the genus, in cultivation.

Profile: A genus of over 150 epiphytic, lithophytic or terrestrial species, found in the Americas from Costa Rica in the north, and south to Bolivia and Uruguay, and including Trinidad and Tobago and the Windward Islands in the Caribbean.

General plant morphology: Sympodial. *Pseudobulb* clavate, cylindrical, fusiform to globose, heteroblastic or homoblastic, erect to suberect, covered by husk-like sheaths, leaves 1–3 in number, terminal. *Leaf* conduplicate, elliptical to oblong to elliptic-lanceolate, thick, leathery to fleshy. *Inflorescence* a raceme, generally subtended by a single, rarely double, oblique spathe, two species with a leafless pseudobulb lacking a spathe, terminal (with two aforementioned exceptions). *Flower* 1 to many in number, usually showy, resupinate, sepals spreading, free, similar, petals free, usually broader, lip usually trilobed, funnel-shaped to tubular, pollinia 4 to 8, sometimes fragrant.

Comments: The recent addition of *Sophronitis* and many of the *Laelia* species (including the “*Purpurata*” group, *Hadrolaelia*, *Hoffmannseggella* and *Microlaelia*) to the genus *Cattleya*, while based on the interpretation of recent genetic studies, is not widely accepted. In addition to floral differences, there are also vegetative characteristics that easily distinguish all of these groups, perhaps with the exception of the “*Purpurata*” group, even out of bloom. In view of this controversy, as well the personal convictions of the authors that many of these will be redefined in the future, the miniature species of *Cattleya* are treated according to their former groupings. Note that none of the species defined in the classical sense as *Cattleya* are small enough to be considered for this book.



Group A

Former species of the *Laelia pumila* group, also known as *Hadrolaelia*

Profile: This group of 6 species, all Brazilian, are epiphytic to rarely lithophytic plants.

General plant morphology: Sympodial, dwarf to miniature in stature. *Pseudobulb* narrowly ellipsoid to globose, round in cross-section, clustered to shortly repent, leaves 1, rarely 2 in number. *Leaf* elliptical to broadly elliptical to ovate, leathery. *Inflorescence* a raceme, lacking sheath. *Flowers* 1–4 in number, often proportionately large, widely spreading to campanulate, lip funnel shaped, sometimes subtly fragrant, pollinia 8.



Figure 4.236 (facing page) Plants of the striking *Cattleya aelandiae* may grow to 20 cm or more in height (Grower: Judy Carney).

Figure 4.237 (above) Two *Cattleya alaorii* blooms photographed in cultivation (Grower: Ron Parsons).

CATTLEYA***Cattleya alaorii*** (Brieger & Bicalho) Van den Berg**Publication:** *Neodiversity* 3: 4 (2008)**Etymology:** Named for Alaor Oliveira, Brazilian orchid collector and employee of the University of São Paulo at Piracicaba, who collected this species on a field expedition in the late 1960s in an isolated mountain chain near Itabuna, Bahia, Brazil.**Homotypic synonyms:** *Laelia alaorii* Brieger & Bicalho, *Sophronitis alaorii* (Brieger & Bicalho) Van den Berg & M.W.Chase, *Hadrolaelia alaorii* (Brieger & Bicalho) Chiron & V.P.Castro.**Heterotypic synonyms:** *Laelia alaorii* f. *dietliana* O.Gruss, *Sophronitis alaorii* f. *dietliana* (O.Gruss) Van den Berg & M.W.Chase, *Cattleya alaorii* f. *dietliana* (O.Gruss) Van den Berg.**Morphology:** *Plant* 5–12 cm tall, creeping, sometimes branching, pseudobulbs spaced 1–3 cm along rhizome. *Pseudobulb* to 6.5 cm tall by 1.5 cm wide, narrow at base, fusiform, erect to suberect, curving upwards, leaf apical, unifoliate. *Leaf* to 9 cm long by 4.5 cm wide, shortly petiolate, broadly oblong, apex obtuse to rounded, sometimes apiculate, lamina erect to spreading, leathery, rigid, glossy dark green to purple in colour. *Inflorescence* a raceme, short to 3 cm long (not including the pedicillate ovary), erect to suberect, terminal. *Flower* 3–4.5 cm in diameter, 1–2 in number, simultaneous, spreading, campanulate. Flowers vary in colour from pink to near white with varying degrees of purplish and yellowish markings on lip.**Range, elevation and habitat:** Endemic to a region of south central Bahia (Brazil), *Cattleya alaorii* is found in the Serra da Onça, not far inland, at elevations of 200–600 m. It grows high in tall trees on moss-covered branches in humid, shaded, primary rainforest on slopes. The temperatures and conditions are fairly uniform throughout the year. This species most probably blooms at any time of the year in nature. Conservation status unknown, but likely to be threatened due to habitat destruction and deforestation.**Culture recommendations:** *Substrate* best mounted on a good sized piece of cork bark or rough-barked hardwood, vertically or horizontally. It may also be potted, but fares best in shallow, bulb-pan type pots or baskets using fine bark mix or possibly New Zealand *Sphagnum* moss. *Temperature* warm to intermediate. *Light* bright shade. *Watering* frequent, but drying briefly between waterings, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/2 strength weekly, reducing frequency and strength of fertiliser in winter.**Comments:** The smallest member of the group of the former section-genus *Hadrolaelia*, when first introduced *Cattleya alaorii* was extremely rare. The species grows at the top of very tall trees and was only discovered accidentally on a fallen branch. Fortunately, due to the determination of growers to propagate the species, it is now widely available. The charming, little, bell-shaped flowers range from pink to white, and the plants often bloom 2–3 times per year. In cultivation they can bloom in any season. It is easy to tell if a new growth contains flower buds by the way it swells, or indeed by holding it up to bright light.**Figure 4.238 (facing page, above)** A purple tinged variant of *Cattleya alaorii* (Grower: Mary Gerritsen).**Figure 4.239 (facing page, below)** *Cattleya alaorii* was once exceedingly rare in cultivation, but is now relatively widespread (Grower: Ron Parsons).



CATTLEYA

Cattleya sincorana (Schltr.) Van den Berg

Publication: *Neodiversity* 3: 11 (2008)

Eymology: From Serra da Sincorá, a mountain range in the centre of the state of Bahia, Brazil.

Homotypic synonyms: *Laelia sincorana* Schltr., *Sophronitis sincorana* (Schltr.) Van den Berg & M.W.Chase, *Hadrolaelia sincorana* (Schltr.) Chiron & V.P.Castr.

Heterotypic synonym: *Cattleya grosvenorii* Rusch.

Morphology: Plant to 15 cm tall, usually smaller, clumping, branching, erect, roots relatively large. *Pseudobulb* to ~3 cm tall, globose to ovoid, leaf apical, unifoliate. *Leaf* to ~10 cm long by up to 3 cm wide, sessile, ovate to elliptic, apex acute to obtuse, lamina conduplicate, thick, leathery, rigid. *Inflorescence* a raceme, peduncle to 6 cm long, erect, terminal, lacking a sheath, buds present when leaf opens. *Flower* 6.5–11 cm in diameter, 1–2 (uncommonly 3, rarely 4) in number, simultaneous, widely spreading, from essentially flat to somewhat reflexed. Flowers vary considerably in shape and intensity of colour.

Range, elevation and habitat: Endemic to the state of Bahia (Brazil), *Cattleya sincorana* grows in the Serra da Sincorá, Serra do Caraça and the Serra do Capa Bade at elevations of 1000–1600 m. It is a locally abundant species that grows on *Vellozia*, often low on the trunks, and occasionally in fissures of rock (fossilised sandstone) at the tops of the mountains, where there is good air movement and high light. The habitat is barren and desert-like, with daytime temperatures averaging over 21 °C (70 °F), but with nightly dew and fog which help to sustain the plants. In the spring, this species experiences temperatures as low as 9 °C (48 °F) and days of low humidity. In the winter, days reach highs of 23 °C (73 °F) and night time temperatures as low as 7 °C (44 °F). The areas where this species is found are often subject to fires. This species can start to bloom by the end of July; the vast majority blooming between October and December.

Culture recommendations: *Substrate* best mounted on cork bark or rough-barked hardwood, not tree fern, with a little moss, but this can be removed once a plant is established if desired. It may also be potted in small pots or baskets using medium bark mix. Some people have success using New Zealand *Sphagnum* moss in pots. *Temperature* intermediate to cool; days can be warm, but night temperatures can be allowed to fall to 12 °C (54 °F), or to 7 °C (44 °F) in the winter. *Light* bright to bright diffused. *Watering* 2–3 times weekly if humidity is good, more frequently if not. It is important that plants dry somewhat between waterings. This species often gets its moisture only from night time fogs in nature, so some growers tend to water this species late in the day. *Humidity* 50–60 %. *Air movement* brisk. *Propagation* by division or seed.



Figure 4.240 (above) A magnificent *Cattleya sincorana* bloom (Grower: Brad Cotten).



Figure 4.241 (above) Multiple flowers of *Cattleya sincorana* in cultivation (Grower: Linda Locatelli).

CATTLEYA

Comments: This truly beautiful species, with its proportionately large, brilliantly coloured flowers, relatively small stature and attractive, often spherical pseudobulbs, captures the attention of everyone who sees it. There are numerous natural colour forms of *Cattleya sincorana*, such as *forma alba* (white), *coerulea* (bluish), *semi-alba* (white with a coloured lip), *delicata* (overall pale pink) and *marmorata* (streaked); these are uncommon to very rare and usually expensive if they can be obtained at all.

Whilst desirable, most of these colour forms are rarely seen outside of Brazil. A rare natural hybrid between *Cattleya sincorana* and *C. elongata*, called *Cattleya × regina*, is found in those regions where the ranges of the two species overlap. *Cattleya sincorana* tends to bloom between March and June or between August and November when cultivated in the northern hemisphere.



Figure 4.242 (above) A pair of *Cattleya sincorana* f. *coerulea* blooms observed in the wild in Brazil. This form produces flowers that are of a more bluish shade of purple (Photo: Mary Gerritsen).

Group B

Species formerly in the genus *Hoffmannseggella*

Profile: A group of over 50 species and natural hybrids, all Brazilian endemics.

General plant morphology: Sympodial, tiny to large in stature, pseudobulbs clustered, plant slowly creeping, often pigmented reddish to purple. *Pseudobulb* short to tall, often narrowly conical, some species with elongated neck, to pencil like, round in cross-section, usually unifoliate. *Leaf* leathery to succulent. *Inflorescence* a raceme, short to very long, from a small sheath. *Flowers* one to many in number, star-shaped, widely spreading to recurved, usually brightly coloured, lip narrow, tubular, usually with undulate margins, keeled, generally not fragrant, pollinia 8.

Comments: All but two of these species are lithophytic, and many are exposed to intense light, though certain of the larger rupicolous species grow amongst tall, dense grasses.

General culture notes: Plants often receive plentiful water during the warm to hot growing season, but winters tend to be much cooler and drier, the plants relying heavily on night mists and condensation to survive. In cultivation, plants benefit from half strength fertiliser and regular watering during the growing season and cooler, drier conditions during winter, with occasional misting to light watering on warmer winter days. A 10 °C (20 °F) day time versus night time temperature differential is necessary for greater success, and very strong air movement is recommended. Generally, the brighter and harder the conditions, the smaller plants will be. The majority of species will tolerate winter lows of 2 °C (35 °F) provided they are kept dry during such extremes. The authors successfully cultivate numerous species of this group in a mix of fine bark and 20 % diatomite (diatomaceous earth); others make use of pure rock (granite, pumice or diatomite) or *Sphagnum* moss with varying degrees of success. Use of 100 % lava rock should probably be avoided since it retains too much moisture, potentially leading to root rot, though a small percentage (~10 %) added to a bark mix should work well. The measurements provided in the species entries are taken from plants in the wild; plants in cultivation often exhibit different dimensions, and are often larger. There is much confusion over the identification of the various species, and plants sold are commonly misidentified.



Figure 4.243 (above) Most *Cattleya ghillanyi* plants are of a miniature stature (Grower: Ron Parsons).

Figure 4.244 (facing page) A stunning bloom of *Cattleya itambana* (Grower: Ron Parsons).



CATTLEYA

Cattleya bradei (Pabst) Van den Berg

Publication: *Neodiversity* 3: 5 (2008)

Etymology: Named for Alexander Curt Brade (1881–1971), a German botanist who specialised in the study of the orchids and ferns of Brazil.

Homotypic synonyms: *Laelia bradei* Pabst, *Sophronitis bradei* (Pabst) Van den Berg & M.W.Chase, *Hoffmannseggella bradei* (Pabst) V.P.Castro & Chiron.

Morphology: *Plant* 5–7 cm tall, clumping, branching, slowly creeping, erect. *Pseudobulb* 2–4 cm tall by up to 1 cm wide, squat, narrowly conical, unifoliate. *Leaf* to 3 cm long by up to 1.5 cm wide, narrowly elliptic, apex acute, lamina channelled on upper side, scoop-like, thick, rigid, leathery, succulent, purple-tinged to often completely purple. *Inflorescence* a raceme, 5–6 cm in length, not much longer than leaves, erect, terminal from sheath. *Flowers* 2.5–3 cm wide, 3–4 in number, simultaneous, widely spreading, lip deeply cut. Flowers vary in shape and in colour from entirely bright yellow to soft yellow with a bright yellow lip.

Range, elevation and habitat: *Cattleya bradei* is a locally common endemic of Minas Gerais state, Brazil, where it is found in a region known as Chapada Diamantina, near the city of Diamantina. It occurs at elevations of 1100–1400 m, growing lithophytically in cracks, crevices and depressions on lichen covered rocks, often near the summit of rocky outcrops, where sand and gravel deposits accumulate. The rhizome and basal part of the pseudobulbs are often covered with sand and lichens. In these areas, the plants experience several months of seasonal drought during the dry, cold winter, but moisture trapped in these depressions, as well as nightly condensation, help the plants to survive long periods without rain. In nature, plants bloom between December and February.

Culture recommendations: See general Group B guidance.

Comments: *Cattleya bradei* has a 5–6 cm inflorescence with 3–4 yellow crystalline flowers that are both bright, attractive and eye-catching. It blooms in the summer to early autumn in cultivation. In nature, the inflorescence tends to be much shorter. This species seems to be most similar to *C. esalqueana*, with a comparable number of flowers, an inflorescence of similar length, and approximately the same bloom period. As a result, it often confuses collectors of these plants. Both species are from the state of Minas Gerais, but from different regions.



Figure 4.245 (above) *Cattleya bradei* plants growing on a rocky outcrop in Brazil (Photo: Greg Allikas).

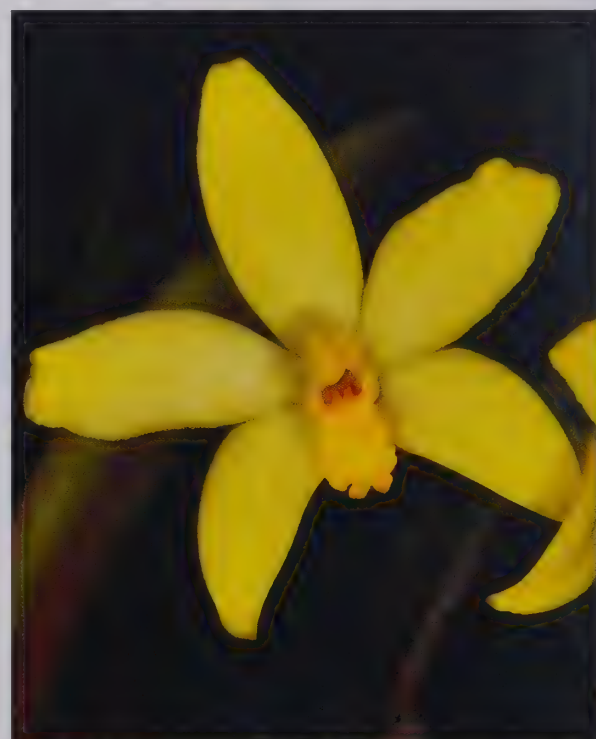


Figure 4.246 (above) The bloom of *Cattleya* cf. *bradei* in cultivation (Grower: Ron Parsons).

CATTLEYA***Cattleya esalqueana*** (Blumensch. ex Pabst) Van den Berg**Publication:** *Neodiversity* 3: 7 (2008)**Etymology:** Named for Escola Superior de Agricultura “Luis de Queiroz” (E.S.A.L.Q.), a college of agriculture in Piracicaba, São Paulo, Brazil.**Homotypic synonyms:** *Laelia esalqueana* Blumensch. ex Pabst, *Sophronitis esalqueana* (Blumensch. ex Pabst) Van den Berg & M.W.Chase, *Hoffmannseggella esalqueana* (Blumensch. ex Pabst) V.P.Castro & Chiron.**Morphology:** *Plant* to 8 cm tall, clumping, slowly creeping, branching, erect, often suffused with purple, pseudobulbs clustered. *Pseudobulb* to 3 cm tall by 0.8 cm wide, narrowly conical, one or occasionally two leaves. *Leaf* to 5 cm long by up to 1.4 cm wide, narrowly oblong, apex acute, lamina scoop-like, erect, thick, rigid, leathery. *Inflorescence* a raceme, 4–5 cm long (equal to or slightly longer than leaves), erect, terminal from sheath. *Flower* 3–3.5 cm wide, 2–4 in number, simultaneous, widely spreading. Flowers vary in colour intensity.**Range, elevation and habitat:** *Cattleya esalqueana* is endemic to the Diamantina region of Minas Gerais state, Brazil, in the region of the Gouvêia and Curvelo municipalities. It can be locally abundant, growing lithophytically at elevations of 1100–1300 m in fully exposed sites on sandstone. It blooms from the end of November to the end of January in Brazil.**Culture recommendations:** See general Group B guidance.**Comments:** This is one of three small species with yellow, starry, and similar-sized flowers from the Diamantina region of Minas Gerais. As a result, these species are often confused. *Cattleya esalqueana* is most similar to *C. bradei* (q.v.). *Cattleya esalqueana* blooms in the summer to early autumn in the northern hemisphere, and is a desirable plant for the collector. It can be a challenge to obtain correctly named plants of this species.**Figure 4.247 (above)** The bloom of *Cattleya esalqueana*, a species closely related to *C. bradei* (Grower: Ron Parsons).

CATTLEYA

Cattleya fournieri (Cogn.) Van den Berg

Publication: *Neodiversity* 3: 7 (2008)

Etymology: Named for the French physician and amateur botanist, Eugène Pierre Nicolas Fournier (1834–1884), author of *Mexicanas plantas* and contributor to C. F. P. von Martius' *Flora Braziliensis* (1885).

Homotypic synonyms: *Laelia longipes* var. *fournieri* Cogn., *Laelia fournieri* (Cogn.) F.E.L.Miranda, *Sophronitis fournieri* (Cogn.) Van den Berg & M.W.Chase, *Hoffmannseggella fournieri* (Cogn.) V.P.Castro & Chiron.

Morphology: Plant 6–8 cm tall, slowly creeping, clumping, branching, erect. *Pseudobulb* to 3 cm tall by up to 1 cm wide, narrowly conical, leaf apical, unifoliate. *Leaf* to 5 cm long by up to 1 cm wide, narrowly elliptic to oblong, apex acute, lamina scoop-like, erect, leathery, rigid, succulent. *Inflorescence* a raceme, to 15 cm long, erect, terminal from sheath. *Flower* 2.5–3 cm wide, to 7 (usually less) in number, simultaneous, widely spreading.

Range, elevation and habitat: *Cattleya fournieri* is endemic to the Serra da Caraça, Minas Gerais state, Brazil, where it grows lithophytically on the rocky ledges of rock outcrops in crystalline formations. It is very common in the Gongo-Soco mountains. This species blooms in late spring to autumn in the wild.

Culture recommendations: See general Group B guidance.

Comments: Perhaps the only uniformly white-flowered species in the *Hoffmannseggella* group, *Cattleya fournieri* has lovely, star-shaped, crystalline-textured blooms with a beautiful, contrasting yellow lip. Once considered a white form of *C. longipes* (formerly *Laelia lucasiana*), it is distinguished from the latter by flower colour, smaller flowers, and narrower segments. A species that is easy to obtain and grow, as well as a reliable bloomer, *C. fournieri* flowers in mid-summer to mid-autumn in cultivation.



Figure 4.248 (above) Clumps of *Cattleya fournieri* growing *in situ*, Serra do Cara, Minas Gerais, Brazil. The plants grow in full sun in a transitional area between Cerrado and Atlantic forest, elevation 1500 m. The reddish colouration in the rock comes from iron deposits (Photo: Leonardo Desordi Lobo).



Figure 4.249 (above) A pair of fine *Cattleya fournieri* blooms in cultivation (Grower: Ron Parsons).

Figure 4.250 (below) The starry blooms of *Cattleya fournieri* captured *in situ* in Brazil (Photo: Leonardo Desordi Lobo).

CATTLEYA***Cattleya itambana* (Pabst) Van den Berg****Publication:** *Neodiversity* 3: 8 (2008)**Etymology:** From the Pico do Itambé. Minas Gerais, Brazil, being the highest point of the Serra do Espinhaço, which extends from Minas Gerais into Bahia.**Homotypic synonyms:** *Laelia itambana* Pabst, *Sophronitis itambana* (Pabst) Van den Berg & M.W.Chase, *Hoffmannseggella itambana* (Pabst) V.P.Castro & Chiron.**Morphology:** *Plant* to 8 cm tall, clumping, slowly creeping, branching, erect. *Pseudobulb* 2.5–3.5 cm tall by 0.6–0.8 cm wide, narrowly conical, unifoliate. *Leaf* to 4.5 cm long by up to 2.5 cm wide, ovate to ovate-elliptical, apex acute, lamina erect, thick, leathery, rigid, succulent, often suffused with red on underside. *Inflorescence* a raceme, usually equal to the length of the leaves, erect, terminal from sheath. *Flower* 3.5–4.5 cm wide, 1–2 (occasionally to 4) in number, simultaneous, widely spreading, two smooth lamellae on lip, pedicillate ovary to 4 cm.**Range, elevation and habitat:** *Cattleya itambana* is a Brazilian endemic originally collected from near the summit of Pico de Itambé in the Diamantina region of Minas Gerais. This species has more recently been found in other nearby areas. It occurs at elevations of 1500–2250 m and grows lithophytically in full sun on sandstone outcrops amongst mosses and lichens. It blooms in January (early summer) in nature. This species can be locally common, but as a narrow endemic it is a species of concern.**Culture recommendations:** See general Group B guidance.**Comments:** The largest flowered of the three yellow *Hoffmannseggella* species from Diamantina featured in this book, *Cattleya itambana* has the most full and pleasing shape, but is constantly confused and misidentified in collections. Although the inflorescences are very short in nature, they can be noticeably longer in cultivation depending on ambient light conditions. This taxon is distinguished from the other two species by its long pedicillate ovary, and by the lip, which bears two smooth lamellae. This species is highly recommended and well worth seeking out, but as with *C. esalqueana*, it is hard to find correctly named plants. *Cattleya itambana* blooms from mid-spring to early autumn in cultivation.**Figure 4.251 (above)** Flowers of the Brazilian endemic, *Cattleya itambana* (Grower: Ron Parsons).**Figure 4.252 (facing page, above)** Flowers of *Cattleya itambana* in profile (Grower: Ron Parsons).**Figure 4.253 (facing page, below)** *Cattleya itambana* can produce multitudes of brilliant yellow blooms (Grower: Ron Parsons).



CATTLEYA

Cattleya kettieana (Pabst) Van den Berg

Publication: *Neodiversity* 3: 8 (2008)

Etymology: Named for Kettie Waras, wife of Eddie Waras, a Danish-born Brazilian orchid collector who lived in São Paulo for many years.

Homotypic synonyms: *Laelia kettieana* Pabst, *Sophranitis kettieana* (Pabst) Van den Berg & M.W.Chase, *Hoffmannseggella kettieana* (Pabst) V.P.Castro & Chiron.

Morphology: *Plant* 3.5–6 cm tall, clumping, branching, slowly creeping. *Pseudobulb* to 3 cm tall by 1 cm wide, conical, enclosed in a papery bract, suffused with purple, leaf apical, unifoliate. *Leaf* to 3 cm long by up to 1 cm wide, conduplicate, narrowly ovate to sometimes narrowly oblong, apex acute, lamina deeply channelled on upper surface, scoop-like, erect, thick, rigid, leathery, succulent, often suffused with purple. *Inflorescence* a raceme to 7.5 cm long including peduncle, twice the length of the leaf, erect, terminal from sheath. *Flower* 2–3 cm wide, proportionately large, 1–5 in number, simultaneous, spreading widely, long lasting, fragrant.

Range, elevation and habitat: *Cattleya kettieana* is a narrow endemic, found in the Serra do Caraça, state of Minas Gerais, Brazil, at elevations of 1500–2000 m. A lithophyte, this species grows in rock fissures variously filled with soil, leaf litter, lichens and small herbs, often with the rhizome and lower parts of the pseudobulbs protected by the rock. In this region and elevation, the summers are hot and humid and the winters cold and dry. This species blooms from October to December in nature. As a narrow endemic, this is a species of concern.

Culture recommendations: See general Group B guidance.

Comments: This beautiful species has up to 5 attractively shaped, long-lasting flowers (to 6 weeks) with a subtle yet pleasing fragrance. It blooms from November to January in cultivation in the northern hemisphere. Often confused with *C. liliputana*, the flowers of *C. kettieana* have a pink lip with a white centre, are generally larger and more fully shaped, and up to 5 in number. *Cattleya kettieana* is a fantastic little species that is not commonly seen, but the authors regard it as one of the best of all miniature orchids and certainly deserving of consideration when available for purchase.

Figure 4.254 (facing page, above) Flowers of *Cattleya kettieana* ‘Gold Country’ in detail (Grower: Ron Parsons).

Figure 4.255 (facing page, below) Flowering plants of *Cattleya kettieana* ‘Gold Country’ presented beautifully in a terracotta pot (Grower: Ron Parsons).



CATTLEYA

Cattleya liliputana (Pabst) Van den Berg

Publication: *Neodiversity* 3: 9 (2008)

Etymology: Alluding to the very small size of the plant, *Lilliputian* refers to the imaginary island nation of tiny people, Lilliput, in Jonathan Swift's fictional work, *Gulliver's Travels*.

Homotypic synonyms: *Laelia liliputana* Pabst, *Hoffmannseggella liliputana* (Pabst) H.G.Jones, *Sophranitis liliputana* (Pabst) Van den Berg & M.W.Chase.

Morphology: *Plant* 1.8–4 cm tall, clumping, branching, slowly creeping, pseudobulbs closely set. *Pseudobulb* to 1.5 cm tall by 1 cm wide, conical, ovoid, globular or oblong, unifoliate. *Leaf* 1–2.5 cm long by 0.8–1.2 cm wide, narrowly oblong, apex acute, lamina conduplicate, deeply channelled on upper surface, scoop-like, folded, erect, very thick, leathery, stiffly rigid, faintly rugose, often tinged with purplish. *Inflorescence* a raceme, 1–3 cm long, erect, terminal, from sheath. *Flower* 2–2.5 cm wide (to 4 cm in cultivation), 1 to 2, rarely 3 in number, simultaneous, spreading widely, characteristic square of orange pigment in the middle of the labellum. Flowers vary in colour from rich pink to white.

Range, elevation and habitat: A rare endemic of the Serra do Ouro Branco, Minas Gerais state, Brazil, *Cattleya liliputana* grows lithophytically on sloping ledges of granite and gneiss around the roots of *Vellozia*, as well as in cracks of horizontal rock outcrops. In this situation it receives in full sun, but is often enveloped in water laden clouds with nightly dew. This species blooms between September and October (spring) in nature.

Culture recommendations: See general Group B guidance.

Comments: One of the tiniest of the rupicolous *Cattleya*, *C. liliputana* is often confused with *C. kettieana*. It is readily distinguished from the latter by its smaller size, fewer flowers, which number 1–2, narrower flower segments, and the characteristic orange square on the lip. This patch of orange is also seen on an unusual white form of *C. liliputana*. In contrast to the limited bloom period in nature, plants in cultivation have been observed to bloom at any time of year.

Figure 4.256 (facing page, above left) A pink variety of *Cattleya liliputana* (Grower: Ron Parsons).

Figure 4.257 (facing page, above right) A predominantly white-flowered variety of *Cattleya liliputana* (Grower: Ron Parsons).

Figure 4.258 (facing page, below) *Cattleya liliputana* plants growing amidst leaf litter in Ouro Branco, Minas Gerais, Brazil (Photo: AWZ).



CATTLEYA

Cattleya longipes (Rchb.f.) Van den Berg

Publication: *Neodiversity* 3: 9 (2008)

Etymology: From the Latin *longus* (long) and *pes* (foot), referring to long, pedicellate ovary of this species.

Homotypic synonyms: *Bletia longipes* (Rchb.f.) Rchb.f., *Laelia longipes* Rchb.f., *Sophranitis longipes* (Rchb.f.) Van den Berg & M.W.Chase, *Hoffmannseggella longipes* (Rchb.f.) V.P.Castro & Chiron.

Heterotypic synonyms: *Laelia lucasiana* Rolfe, *Laelia longipes* var. *lucasiana* (Rolfe).

Morphology: Plant 5–10 cm tall, clumping, slowly creeping, branching, erect. *Pseudobulb* to 5 cm tall by up to 2 cm wide, ovoid to subglobose to conical, leaf apical, one occasionally two in number. *Leaf* to 6 cm long by up to 2.5 cm wide, oblong, apex acute, lamina shallowly concave, thick, rigid, succulent, leathery. *Inflorescence* a raceme, to 8 cm long, erect, terminal from sheath. *Flower* to 5 cm wide, 1–4 (occasionally more) in number, simultaneous, widely spreading to slightly reflexed, fragrant. Flowers vary in colour intensity, with petals and sepals ranging from pink to purple, and the lip from yellow to yellowish-orange.

Range, elevation and habitat: *Cattleya longipes* is endemic to an area east of the city of Belo Horizonte, Minas Gerais state, Brazil, where it grows at elevations over 1300 m in local abundance. The lithophytic plants, which usually grow in exposed conditions in cracks and crevices of granite and gneiss outcrops, receive nightly dew. *Acianthera teres* is often found growing with *Cattleya longipes*. In nature, this species blooms in the spring.

Culture recommendations: See general Group B guidance.

Comments: One of the most popular species of this group, the bright bi-coloured flowers and unusual, light, peppery fragrance are very appealing. The bright purple forms with yellowish-orange lips are the most sought after. One of the most taxonomically confused species in this group, there are probably more plants in cultivation that are labelled with the synonym *Laelia lucasiana* than with the correct name. In cultivation *Cattleya longipes* tends to bloom in early to mid-summer.



Figure 4.259 (above) *Cattleya longipes* growing on rock in Minas Gerais, Brazil (Photo: Greg Allikas).



Figure 4.260 (above) *Cattleya longipes* flower detail, Serra do Cara, Minas Gerais, Brazil (Photo: Leonardo Desordi Lobo).



Figure 4.261 (above) Detail of a *Cattleya longipes* flower in cultivation (Grower: Ron Parsons).

Figure 4.262 (below) *Cattleya longipes* plants growing in full sun in a transitional area between Cerrado and Atlantic forest, elevation 1500 m, Serra do Cara, Minas Gerais, Brazil (Photo: Leonardo Desordi Lobo).

CATTLEYA

Cattleya milleri (Blumensch. ex Pabst) Van den Berg

Publication: *Neodiversity* 3: 9 (2008)

Etymology: Named after H. Miller for contributions to the study of genetics in Brazil.

Homotypic synonyms: *Laelia milleri* Blumensch. ex Pabst, *Sophronitis milleri* (Blumensch. ex Pabst) Van den Berg & M.W.Chase, *Hoffmannseggella milleri* (Blumensch. ex Pabst) V.P.Castro & Chiron.

Morphology: *Plant* to 10 cm tall, but to 15 cm or more in cultivation, creeping, clumping, branching, erect. *Pseudobulb* to 12 cm tall by up to 2.5 cm wide, conical, globose at base constricting to a tapered, elongated apex, usually purple in colour, leaf apical, 1 or occasionally 2 in number. *Leaf* to 10 cm long by up to 3 cm wide, elongate-ovate to elongate-elliptic, apex acute, lamina spreading, often at right angle to pseudobulb, often arcuate, thick, leathery, rigid, rugose, wrinkled transversely, succulent, green to dark purple. *Inflorescence* a congested raceme, long pedunculate, to 50 or more cm long, erect, terminal, from sheath. *Flower* 4–5 cm wide, 4–6 (to 10) in number, usually simultaneous, widely spreading. Flowers vary in colour from orange to brilliant red, also in size of lip, amount of yellow on lip, and width of segments.

Range, elevation and habitat: Endemic to the state of Minas Gerais, Brazil, *Cattleya milleri* grows in the Serra dos Ingleses above the city of Itabira. It occurs at elevations of 800–1300 m and grows as a lithophyte in rock crevices on the steep slopes of mountains rich in iron ore, often around *Vellozia*. It is also found near the city of Belo Horizonte, in the Serra da Moeda, often on southeast-facing slopes of rugged and steep rock, growing with *Vellozia*, grasses, cacti and other xerophytic plants. It blooms between November and December in nature, and is quite rare. It is threatened by mining activities and over-collection. Indeed, *Cattleya milleri* was at one time thought to be extinct in the wild.

Culture recommendations: See general Group B guidance.

Comments: In nature, this species qualifies as a miniature, but in the softer conditions of cultivation it can grow larger. Moreover, if the leaves were erect and not spreading, it would not meet the criteria for a miniature species; nonetheless, it is well worth growing. *Cattleya milleri* has unusual, rugose, transversely-wrinkled leaves that are solid purple when grown in bright light. The pseudobulbs are almost always solid purple, and the flowers range from brilliant red through to bright orange. There are other species in this group with orange flowers, but none ever produce true red blossoms. It tends to bloom from late spring to early autumn in cultivation.

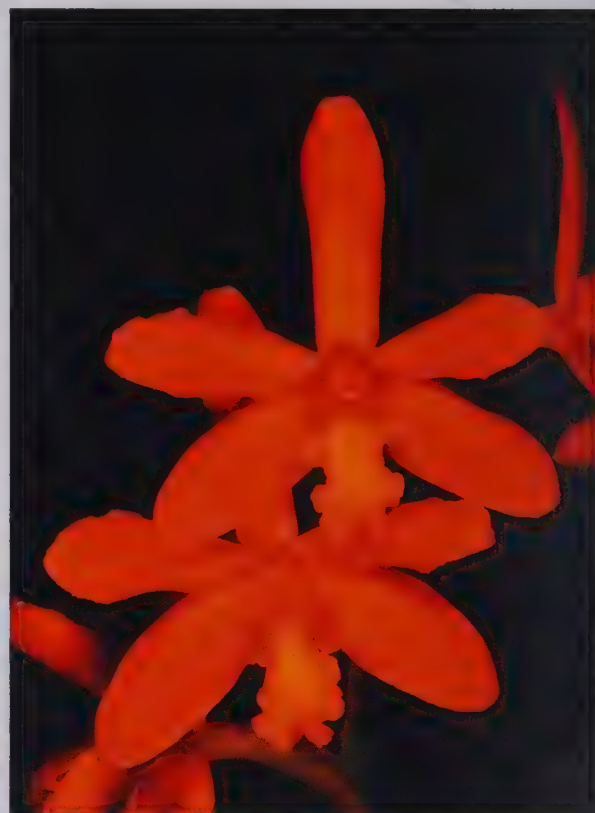


Figure 4.263 (above) Striking, orangey red blooms of *Cattleya milleri* (Grower: Dave Hermeyer).



Figure 4.264 (above) The elegant inflorescences of a well grown plant of *Cattleya milleri* (Grower: Tom Biggart).



Figure 4.265 (above left) Certain *Cattleya milleri* varieties are capable of producing flowers of true red (Grower: Fred Schull).

Figure 4.266 (above right) *Cattleya milleri* in flower, Minas Gerais, Brazil (Photo: Greg Allikas).

Figure 4.267 (below) Various *Cattleya milleri* plants flowering *en masse* in a nursery (Grower: Andy's Orchids).

CATTLEYA

Cattleya reginae (Pabst) Van den Berg

Publication: *Neodiversity* 3: 11 (2008)

Etymology: Named for Regina Angerer, who flowered the type specimen after its discovery.

Homotypic synonyms: *Laelia reginae* Pabst, *Sophranitis reginae* (Pabst) Van den Berg & M.W.Chase, *Hoffmannseggella reginae* (Pabst) V.P.Castro & Chiron.

Morphology: *Plant* to 12.5 cm tall, clumping, branching, creeping, erect. *Pseudobulb* to 6 cm tall by up to 2 cm wide, ovoid to narrowly conical, leaf apical, unifoliate. *Leaf* to 6.5 cm long by up to 1.5 cm wide, narrowly oblong, apex acute, lamina channelled on upper surface, scoop-like, erect, thick, leathery, succulent, rigid, suffused with purple. *Inflorescence* a raceme, 2–5 cm long, erect, terminal, from sheath. *Flower* 1.5–3 cm wide, to 4 in number (occasionally more), simultaneous, widely spreading, crystalline in texture, relatively long lasting. Flowers vary in colour from lavender through pink to nearly white.

Range, elevation and habitat: *Cattleya reginae* is endemic to the Serra da Moeda, in the Brazilian state of Minas Gerais, at elevations of 1200–2000 m. It grows lithophytically on rock ledges, usually around the roots of *Vellozia*, and can be locally abundant. In nature, this species blooms between September and December.

Culture recommendations: See general Group B guidance.

Comments: A lovely species, *Cattleya reginae* has starry shaped, widely spreading, crystalline, lavender to pinkish flowers. There is also a white form, though it is not a true *alba* due to the brightly coloured lip. Plants of this species are relatively available and it seems to be a reliable bloomer, flowering between early spring and early summer in cultivation.



Figure 4.268 (above) The elegant blooms of *Cattleya reginae*, seen here in cultivation (Grower: Ron Parsons).

Figure 4.269 (facing page) Flower detail of a different *Cattleya reginae* clone (Grower: Ron Parsons).



Group C

Species formerly in the genus *Sophronitis*

Profile: A group of approximately 9 epiphytic, occasionally lithophytic, species from Brazil, with one species extending to Paraguay, Bolivia and northern Argentina.

General plant morphology: Sympodial, small in stature, often suffused with reddish to purple pigmentation. *Pseudobulb* generally narrowly ellipsoid to globose, sometimes flattened, leathery, unifoliate. *Inflorescence* a raceme, short, no sheath, buds present when leaf opens. *Flowers* one to many in number, full-flowered, sepals usually narrower than petals, brightly coloured, lip narrow, tubular, not fragrant, pollinia 8.

Comments: This group of orchids is an absolute favourite amongst collectors in general; for growers of miniatures, there are few groups that surpass it. All of the species have brightly coloured flowers and, with one exception, produce flowers that are disproportionately large in relation to the plants themselves. Certain of the species within this group are considered difficult to grow, but these can be cultivated with great success provided that their particular needs are met. Fertilise weekly at 1/4 to 1/2 strength, reducing frequency and strength of fertiliser during winter.



Figure 4.270 (above) *Cattleya cernua* growing epiphytically on a tree trunk in Brazil (Photo: Leonardo Desordi Lobo).

CATTLEYA

Cattleya acuensis (Fowlie) Van den Berg

Publication: *Neodiversity* 3: 4 (2008)

Etymology: From Pico de Açu, the highest mountain in the Organ Mountains, in the Brazilian state of Rio de Janeiro.

Homotypic synonyms: *Sophranitis acuensis* Fowlie, *Hadrolaelia acuensis* (Fowlie) Chiron & V.P.Castro.

Morphology: *Plant* 2 to 5 cm tall, branching, clumping, slowly creeping, pseudobulbs clustered, arranged randomly. *Pseudobulb* 0.5–3 cm tall by 0.3–1 cm wide, subglobose to narrowly ovoid to ellipsoid, sometimes slightly curved, rugulose, pseudobulbs erect to nearly prostrate, leaf apical, unifoliate. *Leaf* 2–5 cm long by 1–2 cm wide, shortly petiolate to 0.8 cm long, narrowly oblong to ovate, apex acute, apiculate, lamina erect to spreading, thick, rigid, leathery, dorsal side lacking purple central stripe, underside often purplish. *Inflorescence* a raceme, peduncle 1.5–2 cm, terminal. *Flower* 3–6 cm wide, one to two in number, widely spreading, long pedicellate ovary. Flowers vary in shape and in colour from orange-red to deep red, also in the amount of yellow present in lip.

Range, elevation and habitat: A species endemic to the state of Rio de Janeiro, Brazil, *Cattleya acuensis* occurs in the Organ Mountains (Pico de Açu to the mountains of Novo Friburgo) in a very cold, windy habitat subject to frequent mist. Plants favour sites amongst lichens and moss on scrubby, hardwood trees in wooded gullies, often along watercourses at elevations of 1800–2100 m. In nature, blooms occur from September to November (spring and early summer in the southern hemisphere). Conservation status unknown.



Figure 4.271 (above) The brilliant, flattened blooms of *Cattleya acuensis*, seen here in cultivation (Grower: Ron Parsons).

CATTLEYA

Culture recommendations: *Substrate* best mounted on cork bark or rough-barked hardwood, but plants have been seen growing well potted in small pots in xaxim (fibre from *Dicksonia*, a Brazilian tree fern) as well as fine bark mix or New Zealand *Sphagnum* moss. The authors have several plants growing on horizontal limbs of *Leptospermum* (Australian Tea Tree), upon which they thrive. *Temperature* cool, tolerating lows of 5 °C (41 °F) in the winter, but best kept above 10 °C (50 °F). *Light* bright diffuse to bright shade. *Watering* basically moist but drying slightly and briefly between waterings, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: Not as commonly seen in cultivation as other members of the *Sophranitis* group, *Cattleya acuensis* is the coolest growing species and is known to be intolerant of overly warm conditions. If year-round cool conditions cannot be maintained, this species will eventually fail. Whilst regarded by some as nothing more than an ecotype of *C. coccinea*, *C. acuensis* lacks the purple stripe on the mid-vein of the leaf, a characteristic of *C. coccinea*. Other distinguishing characters are the often purple suffusion on the underside of the leaves and the lip, which on average, has more yellow than other species of the group, and the sometimes nearly round pseudobulbs. In fact, this species is more easily confused with *C. manticueirae* than *C. coccinea*. Although the flower shape is not usually as graceful as that of *C. coccinea*, *C. acuensis* has proportionately large, brilliantly coloured, flat flowers, and plants with many blooms are truly exceptional. Plants may grow substantially larger in cultivation, with pseudobulbs to 5 cm and leaves to 8 cm long. This very desirable species blooms in cultivation in the early winter to early spring, as well as in late summer to early autumn.



Figure 4.272 (above) Another variety of *Cattleya acuensis*, with a contrasting yellow and orange labellum (Grower: Ron Parsons).

CATTLEYA

Cattleya brevipedunculata (Cogn.) Van den Berg

Publication: *Neodiversity* 3: 5 (2008)

Etymology: From the Latin *brevi* (short) and *pedunculatus* (flower stem), in reference to the very short peduncle.

Homotypic synonyms: *Sophranitis wittigiana* var. *brevipedunculata* Cogn, *Sophranitis brevipedunculata* (Cogn.) Fowlie, *Hadrolaelia brevipedunculata* (Cogn.) Chiron & V.P. Castro.

Morphology: *Plant* to 5 cm tall, branching, clumping, creeping, pseudobulbs arranged in two alternate rows along the rhizome. *Pseudobulb* to 2.5 cm long by 1 cm wide, narrowly oblong to narrowly ovoid to nearly globose, older pseudobulbs slightly furrowed, leaf apical, unifoliate. *Leaf* to 4.5 cm long by 2 cm wide (rarely larger), shortly petiolate to 0.5 cm, ovate, apex acute to obtuse, lamina spreading to prostrate, thick, leathery, rigid, commonly suffused with reddish purple. *Inflorescence* a raceme, peduncle very short, to 1 cm long, terminal. *Flower* 2.5–7.5 cm wide, one, rarely two in number, resupinate, widely spreading, segments commonly darker veined, petals proportionately large. Flowers vary in shape and in colour from pinkish red to rosy red.

Range, elevation and habitat: *Cattleya brevipedunculata* is endemic to Brazil, from the states of Minas Gerais (Serra de Espinhaga, Serra de Ibitipoca and Serra do Cipe), Espírito Santo and Rio de Janeiro. It grows on *Vellozia* or sometimes on rocks, or in dry, cool,



Figure 4.273 (above) A pinkish red flower of *Cattleya brevipedunculata* (Grower: Hanging Gardens).

CATTLEYA

scrubby, high montane ridge forests, usually at elevations of 1000–1300 m, but sometimes as high as 2000 m. It can experience day time temperatures up to 38 °C (100 °F), with low humidity and high light, but typically much cooler, moister, evenings with heavy dew, through most of the year. The areas where this species occurs are subject to fires. It blooms in nature between April to May, and August to October according to elevation and aspect, and is sometimes found growing with species of rupicolous Group B *Cattleya* (formerly *Hoffmannseggella*). This species can be locally common.

Culture recommendations: *Substrate* best mounted, on cork bark or rough-barked hardwood, using only a little New Zealand *Sphagnum* moss which is best removed when the plant is established. Occasionally, plants are imported on pieces of *Vellozia* or xaxim (Brazilian tree fern). Plants may also be potted in New Zealand *Sphagnum* moss, but mounting is preferable as this is a drier-growing species. Once established, this species resents root disturbance. *Temperature* intermediate, tolerating cooler nights down to 3–4 °C (38 °F), but best with minimum temperatures of 13 °C (55 °F). *Light* bright diffused to bright shade. *Watering* 2–3 times weekly, making sure that plants dry completely between waterings. *Humidity* average, 50 % during the day, higher at night. Some people prefer to water this species late in the day to simulate evening fog. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: This incredibly desirable species has flowers so large that they can obscure the plant. The flowers are typically rosy red to pinkish red, lacking the intense, brilliant red tones of *C. coccinea*, but also come in several unusual, rare colour forms, including beige, milky yellow, yellow, blue, ‘barboleta’ (with yellowish streaks in the petals), and striata (with lighter coloured stripes in the petals). Such forms would be very expensive if available at all. One of the characteristics of this species is the opposite, two-rowed arrangement of the pseudobulbs. *Cattleya wittigiana* is the species most likely to be confused with *C. brevipedunculata* since it has a similar growth habit, but the latter typically has flowers that are more reddish pink. Additionally, the peduncles of *C. brevipedunculata* are shorter than the leaves, whereas those of *C. wittigiana* surpass the leaves in length. In cultivation, *C. brevipedunculata* blooms in early summer, and late autumn to early winter.



Figure 4.274 (above) A fine example of *Cattleya brevipedunculata* (Grower: Brad Cotten).

Figure 4.275 (facing page, above) Blooming *Cattleya brevipedunculata* plants growing on trees in Brazil (Photo: Ron Kaufmann).

Figure 4.276 (facing page, below) A *Cattleya brevipedunculata* bloom with almost rosy red colouration (Grower: Russ Varnado).



CATTLEYA

Cattleya cernua (Lindl.) ined.

Etymology: From the Latin *cernuus* (nodding), in reference to the form of the inflorescence.

Homotypic synonyms: *Sophronia cernua* Lindl., *Sophronitis cernua* (Lindl.) Lindl.

Heterotypic synonyms: *Sophronia modesta* Lindl., *Sophronitis hoffmannseggii* Rchb. ex Hoffmanns., *Sophronitis isopetala* Hoffmanns., *Sophronitis nutans* Hoffmanns., *Sophronitis pterocarpa* Lindl. & Paxton, *Cattleya pterocarpa* Beer, *Sophronia pterocarpa* (Lindl. & Paxton) Kuntze, *Sophronitis cernua* var. *albiflora* Cogn., *Sophronitis cernua* var. *alagoensis* Gomes Ferreira.

Morphology: Plant 2.5–6 cm tall, clumping, branching, creeping, mat-forming. Pseudobulb to 3.5 cm tall by up to 1.8 cm wide, ovoid, to subcylindrical, somewhat flattened laterally, leaf apical, unifoliate. Leaf 1–4.5 cm long by 0.5–3 cm wide, nearly sessile, ovate to oblong, apex obtuse, lamina spreading to prostrate, stiff, succulent, leathery. Inflorescence a raceme, to 5 cm long (short pedunculate), terminal. Flower 1.5–2.5 cm wide, 2–7 (rarely to 10) in number, spreading and campanulate to widely spreading. Flowers vary in size, somewhat in shape and degree of openness, and in colour intensity from light orange to bright reddish-orange.

Range, elevation and habitat: *Cattleya cernua* occurs in both Cerrado and Mata Atlântica phytogeographic regions, from Brazil (states of Bahia, Mato Grosso do Sul, Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul) to Paraguay and Argentina (province of Misiones). This widespread and common species grows in a variety of habitats including the coastal mountains of Rio de Janeiro state, in the Organ Mountains, in the Serra da Mantiqueira, and as far as 965 km inland in dry and open forests. It occupies elevations from sea level up to 1220 m. Near the ocean, it grows on rocks where it can experience salt spray, and in the coastal mountain rainforests it is found on high canopy branches. Further inland it can be seen in dry, shrubby forests and savannah trees. It blooms in October to December, and May to August in nature.

Culture recommendations: Substrate best mounted on flat piece of cork bark, rough-barked hardwood, rough wood shingles, or possibly a hard tree fern. May also be potted in a well-drained medium of your choice, using a shallow bulb pan or basket, but ensuring that the plant dries out between waterings. Temperature warm to intermediate, best kept above 16 °C (60 °F). This species tolerates temperature highs of 38 °C (100 °F) and lows of 10 °C (50 °F). Light bright to bright diffused. Watering water, then allow to dry thoroughly, do not keep roots wet. Humidity high. Air movement good to brisk. Propagation by division or seed.



Figure 4.277 (above) Numerous *Cattleya cernua* plants growing epiphytically *in situ* at 1200 m elevation, Bueno Brandão, Minas Gerais, Brazil (Photo: Leonardo Desordi Lobo).



Figure 4.278 (above) The massed, bright blooms of *Cattleya cernua* are a delight to behold (Grower: White Oak Orchids).

CATTLEYA

Comments: Certainly one of the finest of all miniature orchid species, everything about *Cattleya cernua* is attractive. Although the flowers are short-lived, at two weeks, when compared to its relatives, it more than makes up for that with its multitudes of brilliant orange to nearly red blossoms. Even the plant draws attention with its nearly round, hard, leathery leaves and stout pseudobulbs with their flattened, shingle-like appearance. Stunning specimen plants of this species in full bloom have been known to draw audible gasps from onlookers.

There are a number of named colour forms including var. *endzfeldii* (pale yellow) and var. *lowii* (lemon yellow). There is also a var. *mineira* which has pseudobulbs that grow in double rows. A form once known as a separate species, *Sophronitis pterocarpa*, has large, winged seed capsules, but that name is now considered a synonym. There have been numerous plants sold as *Sophronitis cernua* var. *acunae*, but this varietal name is invalid and these are nothing more than plants of *C. cernua* originating from Paraguay. In cultivation, *Cattleya cernua* tends to bloom in the autumn to early winter.

Figure 4.279 (right) Detail of a *Cattleya cernua* plant in fruit, growing as an epiphyte on a tree trunk (Photo: Leonardo Desordi Lobo).

Figure 4.280 (below) The fine, brightly coloured blooms of *Cattleya cernua* are widely admired (Grower: Howard Gunn).



CATTLEYA

Cattleya coccinea Lindl.

Publication: *Edwards's Bot. Reg.* 22: t. 1919 (1836)

Etymology: From the Greek *coccineus* (scarlet) referring to the flower colour.

Homotypic synonyms: *Sophronitis grandiflora* Lindl., *Cattleya grandiflora* (Lindl.) Beer, *Sophronitis coccinea* (Lindl.) Rchb.f., *Sophronia coccinea* (Lindl.) Kuntze, *Hadrolaelia coccinea* (Lindl.) Chiron & V.P. Castro

Heterotypic synonyms: *Sophronitis militaris* Rchb.f. in W.G. Walpers, *Sophronitis rossiteriana* Barb.Rodr., *Sophronia militaris* (Rchb.f.) Kuntze, *Sophronitis coccinea* f. *rossiteriana* (Barb.Rodr.) Pabst & Dungs, *Cattleya coccinea* var. *rossiteriana* (Barb.Rodr.) Van den Berg.

Morphology: Plant 3–10 cm tall, rarely greater than 7.5 cm tall, clumping, branching, pseudobulbs closely set to 1.5 cm apart. *Pseudobulb* 1.5–4.5 cm long by up to 0.6 cm wide cylindrical, fusiform, erect to suberect, leaf apical, unifoliate. *Leaf* 2.5–7 cm long by up to 2.5 cm wide, shortly petiolate, conduplicate at base, oblong-elliptic to narrowly oblong, apex acute to obtuse, lamina erect to spreading, leathery, dark green, usually with reddish purple mid-rib and occasionally along leaf edge or entire leaf. *Inflorescence* a raceme, peduncle to ~1 cm long, terminal. *Flower* 2.5–8 cm wide, 1–2 in number, extremely rarely 3, simultaneous, resupinate, spreading widely, pedicel 2 cm long. The size of the leaves and pseudobulbs varies, and flowers vary in shape and in colour from dark orange to red, rarely light orange to yellow.

Range, elevation and habitat: *Cattleya coccinea* is abundant throughout its range, and is endemic to the Mata Atlántic phytogeographic region of Brazil (states of Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul) and neighbouring northeast Argentina (Misiones). Commonly found on mountain ridges, in windy cloud forest, misty rainforest (called *garôa*) and subtropical rainforests, *C. coccinea* grows on as an epiphyte, occasionally as a lithophyte, and rarely as a terrestrial. It is found at low to mid tree level on mossy trunks, on the ends of branches of shrubs, and at the tops of tall trees, at elevations of 600–1500 m, but almost always at elevations above 1300 m in the Organ mountains. This species is often found growing with many species of bromeliad, as well as numerous orchids including *Promenaea xanthina*, *Scuticaria hadwenii*, *Pabstia jugosa*, *Gomesa* (formerly *Oncidium*) *gardneri* and miscellaneous pleurothallids. This species is spring blooming, but often has a second bloom in the autumn.

Culture recommendations: Substrate mount on cork, bark, rough-barked hardwood, rough wood shingles, and possibly Brazilian tree fern (xaxim). It may also be potted in a fine bark mix. Some people use New Zealand *Sphagnum* moss, but the highest quality should be used.



Figure 4.281 (above) The flower of *Cattleya coccinea* 'Marsh Hollow' (Grower: Ron Parsons).

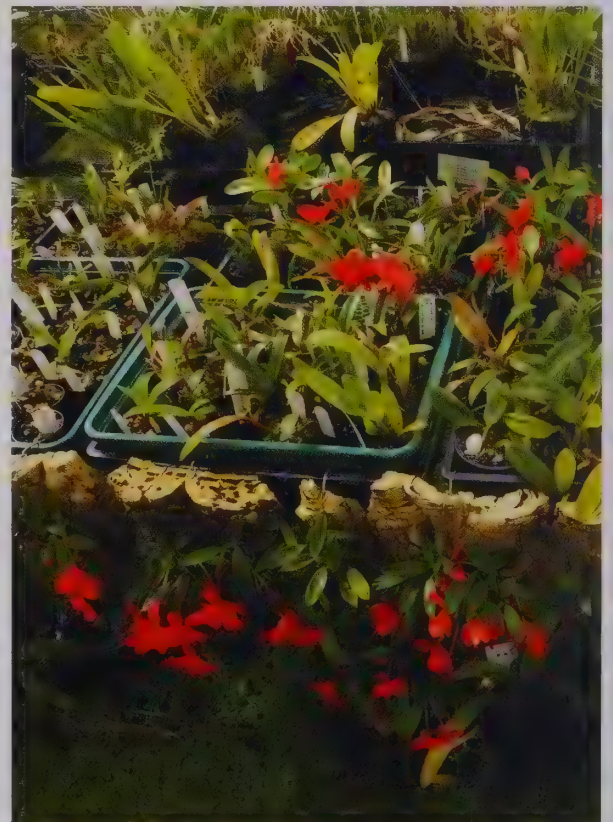


Figure 4.282 (above) Assorted *Cattleya coccinea* plants in cultivation (Grower: Chris Nicholas).



Figure 4.283 (above) The bloom of the yellow flowered *Cattleya coccinea* var. *lobbii* (Grower: Ron Parsons).

Figure 4.284 (below) A handsome clump of *Cattleya coccinea* growths in bloom (Grower: Dieter Weise).

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Temperature intermediate-cool to cool. The plants can take cool temperatures to 2 °C (35 °F) and are best kept below 27 °C (80 °F) during the day. *Light* bright diffused to medium shade. When grown in bright light make sure plants receive high humidity. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: *Cattleya coccinea* ranks amongst the top favourites of the authors. There is a range of different forms, many of which are highly prized, rare and sometimes quite expensive. In Japan, this species is highly cherished and there are a number of growers who have large collections dedicated to *C. coccinea*. There are a few ecotypes as well as several varieties of this species. The ecotype known as *coccinea* comes from bright situations and has short, broad leaves with a red midvein and typical ellipsoid pseudobulbs. Perhaps the rarest ecotype, *insularis* is found on small branches in bright light. It has shorter leaves, with reddish purple mid-veins and margins, and egg-shaped pseudobulbs. A third ecotype, *militaris*, comes from dark forests, and has thin pseudobulbs that grow in rows.

Numerous named colour forms exist, including var. *lobbii* (yellow), var. *rossiteriana* (orange-yellow), var. *pallens* (light brick red), var. *carmesa* (carmine red), var. *discolor* (brick red with darker venation and a solid yellow lip), var. *striata* (red with darker veins), var. *barboleta* (red with a yellow centre to the petals), var. *labelloid* (a peloric variety), var. *gigantea* (tetraploid and large flowered), but all of these are expensive if offered for sale; as such, it is best to purchase these varieties when in bloom to ensure that they are indeed as labelled. There are also some man-made tetraploids of variable merit, and these are also generally costly. This extremely popular and rewarding species can bloom twice a year, once in the spring and again in the autumn. The long lasting flowers have the interesting tendency to expand for a period after opening, becoming larger and fuller. If the necessary culture conditions can be provided, this is truly a species that one cannot overlook.



Figure 4.285 (above) *Cattleya coccinea* plants growing at the base of a small tree, Rio de Janeiro state, Brazil, at approximately 1300 m elevation (Photo: Mary Gerritsen).



Figure 4.286 (above) A brilliantly coloured *Cattleya coccinea* bloom in the wild (Photo: Ron Kaufmann).



Figure 4.287 (above) Three *Cattleya coccinea* colour forms (Grower: Kay Rinaman).

Figure 4.288 (below) A fine trio of *Cattleya coccinea* (4N) blooms from a pot grown plant (Grower: Golden Gate Orchids).

CATTLEYA

Cattleya dichroma Van den Berg

Publication: *Neodiversity* 3: 6 (2008)

Etymology: From the Greek *di* (two) and *chroma* (colour), a reference to the flower colours.

Homotypic synonyms: *Sophronitis bicolor* F.E.L.Miranda, *Hadrolaelia bicolor* (F.E.L.Miranda) Chiron & V.P.Castro.

Morphology: *Plant* to 13 cm tall, creeping, branching, pseudobulbs spaced 1–1.5 cm apart along rhizome. *Pseudobulb* to 6.5 cm tall by up to 1 cm wide, cylindrical to fusiform, unifoliate. *Leaf* to 7 (rarely 11) cm long by up to 2 (rarely to 2.5) cm wide, petiolate, elliptic-oblong, apex acute to obtuse, lamina erect to spreading, leathery, sometimes suffused with purple. *Inflorescence* a raceme, to 11 cm long (5.5 cm peduncle and to 5.5 cm pedicillate ovary), terminal. *Flower* to 6.5 cm wide, 1 or rarely 2 in number, simultaneous, resupinate, widely spreading. Flower colour varies from orange to red, and in the percentage of yellow on the lip.

Range, elevation and habitat: *Cattleya dichroma* is endemic to Brazil, where it grows in the Organ Mountains (Serro do Mar, Serra Paranapiacoba, and a small area of Pico Forno Grande) in the state of Espírito Santo at elevations of 1220–1525 m. It grows epiphytically in shady and humid conditions in windy cloud forests and in rainforests. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly hard tree fern, using a pad of New Zealand *Sphagnum* moss around the roots. It may also be potted in a fine bark mix or moss. *Temperature* intermediate days, but cool nights. In the winter, temperatures are best kept above 7 °C (45 °F), and in the summer, highs of less than 30 °C (85 °F) are advised. *Light* bright diffuse to medium shade. *Watering* keep moist, well drained, not wet. Plants may be allowed dry out briefly between waterings without harm. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. This uncommon species should be propagated and distributed whenever possible.

Comments: Infrequent to rare in collections, *Cattleya dichroma* tends to bloom in cultivation in late spring or autumn, sometimes twice a year. Blooms last for 6–8 weeks. Now recognised as a unique species, this taxon was formerly referred to as *Cattleya* (*Sophronitis*) *coccinea* var. *xanthocheila* for many years. Compared to *C. coccinea*, this species has, on average, larger flowers on a much longer peduncle and a lip that can be almost entirely orange-yellow. In addition, the leaves have a longer petiole and lack the purple midvein and leaf margins. A highly recommended taxon.



Figure 4.289 (above) The flower of *Cattleya dichroma* 'Highland' (Grower: Ron Parsons).



Figure 4.290 (above) The Brazilian *Cattleya dichroma* may bloom twice per year (Grower: Ron Parsons).

CATTLEYA

Cattleya mantiqueirae (Fowlie) Van den Berg

Publication: *Neodiversity* 3: 9 (2008)

Etymology: From the Serra da Mantiqueira, a mountain range in Rio de Janeiro and Minas Gerais states, Brazil.

Homotypic synonyms: *Sophronitis coccinea* ssp. *mantiqueirae* Fowlie, *Sophronitis mantiqueirae* (Fowlie) Fowlie, *Hadrolaelia mantiqueirae* (Fowlie) Chiron & V.P.Castr.

Morphology: *Plant* 2.5–6 cm tall, branching, clumping, slowly creeping, erect to suberect, pseudobulbs clustered. *Pseudobulb* 1–2.5 cm long by 0.3–1.5 cm wide when ellipsoid, 2–2.5 long by 0.3–0.5 cm wide when fusiform to ovoid to subglobose, arranged randomly, unifoliate. *Leaf* 3–4 cm long by 1.2–3 cm wide, shortly petiolate, narrowly ovate to ovate to oblong, apex acute to obtuse, lamina thick, rigid, leathery, leaves green dorsally, but suffused with purple beneath. *Inflorescence* a raceme, much shorter than leaves, terminal. *Flower* 2.5–4.5 cm (rarely to 10 cm) wide, one to rarely 2 in number, simultaneous, widely spreading, lip with 3–5 veins of red. Flower varies distinctly in size as well as in shape, and in colour from dark orange to bright red, and in the amount of yellow colouration in the lip.

Range, elevation and habitat: *Cattleya mantiqueirae* is endemic to Brazil, where it can be locally common in the Organ Mountains of Minas Gerais, Rio de Janeiro and São Paulo states, elevation 1220–2000 m. It grows in a variety of habitats, including ridge forest, rainforest and cool, drier forests of *Araucaria* and *Podocarpus* generally above 1800 m on the Mantiqueira Massif. It favours moss covered trunks and the branches of saplings in stream gullies, and the lichen covered branches of rough barked trees in bright, filtered light and windy situations.



Figure 4.291 (above) Multiple blooms of *Cattleya mantiqueirae* make for an impressive display (Grower: Ron Parsons).

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Plants growing in ridge forest have rounded pseudobulbs and shorter, harder leaves, whereas those growing in less light tend to have narrower, elongate leaves and pseudobulbs. These regions have cold winters, with 10–15 °C (50–60 °F) days, and nights near freezing. The summers are rainy, crisp, and cool, with daytime temperatures to 26 °C (80 °F) and nights to 9 °C (48 °F). The leaves are often buried in the moss, and plants frequently grow with many other epiphytic orchids, including *Loefgrenianthus blanche-amesiae*, *Isabelia violacea*, *Grandiphyllum* (formerly *Oncidium*) *edwallii*, *Gomesa gardnerii*, *G. pectoralis*, *G. concolor* (all formerly *Oncidium*), *G. imperatoris-maximiliani* (formerly *Oncidium crispum*), *Dryadella lilliputiana* and *Phymatidium delicatulum*. This is the only former *Sophronitis* species to bloom in midsummer (January-February) in nature. This species may also bloom a second time in September-October, but generally does so with fewer flowers.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small, rough wood shingles or Brazilian tree fern (xaxim). It may also be potted in a fine bark mix or possibly high grade New Zealand *Sphagnum* moss. *Temperature* cool. *Light* bright diffuse to bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: This beautiful and floriferous member of the former genus *Sophronitis* was once considered a subspecies of *Cattleya coccinea*, but *C. mantiqueirae* is easy to differentiate by the purple suffusion on the underside of the leaves and by the 3–5 red veins on the lip; *C. coccinea* has a purple midvein and occasionally purple margins on the dorsal surface of the leaves, as well as 7–9 red veins of colour on the lip. *Cattleya mantiqueirae* has both small and large flowered forms. The large flowered forms can be quite impressive, with exceptional blooms to 10 cm across.

There are at least two named varieties of *C. mantiqueirae*. The variety called *parviflora* has flowers up to 2.5 cm wide, but is actually just a small-flowered form growing within normal populations. Plants of the other variety, var. *varonica* [sic], have unusual bluish green colouration, quite small, roundish pseudobulbs and leaves, and yellowish to salmon coloured flowers. This form is from a very limited area, where it grows on the vertical trunks of old trees. It is much prized by collectors and as a result has unfortunately been decimated in the wild. *Cattleya mantiqueirae* blooms twice a year, first in early spring and then again from midsummer to late autumn.



Figure 4.292 (above) A beautifully presented, mounted growth of *Cattleya mantiqueirae* in full bloom (Grower: Amy Jacobsen).

CATTLEYA

Cattleya wittigiana (Barb.Rodr.) Van den Berg

Publication: *Neodiversity* 3: 12 (2008)

Etymology: In honour of Emile Wittig, a 19th century Brazilian orchid collector, who discovered and sent the species to London in 1880.

Homotypic synonyms: *Sophronitis wittigiana* Barb.Rodr., *Hadrolaelia wittigiana* (Barb.Rodr.) Chiron & V.P.Castro.

Heterotypic synonyms: *Sophronitis purpurea* Rchb.f. nom. illeg., *Sophronitis rosea* hort. ex Gostling, *Sophronitis grandiflora* var. *purpurea* (Rchb.f.) A.H.Kent, *Sophronitis wittigiana* var. *longifolia* Cogn, *Hadrolaelia wittigiana* f. *candida* (Roeth & O.Gruss) Roeth & O.Gruss, *Sophronitis wittigiana* f. *candida* Roeth & O.Gruss, *Cattleya wittigiana* f. *candida* (Roeth & O.Gruss) Van den Berg.

Morphology: Plant 4.5–7 cm tall, slowly creeping to clumping, branching, pseudobulbs closely set, arranged in two alternate rows along the rhizome, mat-forming. *Pseudobulb* to 3 cm long by up to 1 cm wide, fusiform to ovoid-oblong to almost globose, suberect to nearly prostrate, unifoliate. *Leaf* to 5 cm long by up to 2 cm wide, shortly petiolate, broadly ovate to oblong, apex obtuse to acute, lamina flat to arcuate, erect to spreading, thick, rigid, leathery, often suffused with purple on top and bottom. *Inflorescence* a raceme, peduncle with pedicellate ovary 6–8 cm long (longer than leaves), terminal. *Flower* 4.5–7.5 (rarely to 10) cm wide, 1 or rarely 2 in number, simultaneous, resupinate, widely spreading. Flowers vary distinctly in shape and depth of colour.



Figure 4.293 (above) The elegantly veined flowers of *Cattleya wittigiana* are as pretty as they are spectacular (Grower: Kay Rinaman).

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Range, elevation and habitat: *Cattleya wittigiana* is endemic to Brazil, from the states of Espírito Santo and Minas Gerais, where it is found at elevations of 700–2000 m. It grows as an epiphyte on trees in windy cloud forest, in bright situations on ridges, and in shady and humid forest in wet, sometimes pooled gullies. In Espírito Santo it has been seen growing right alongside *C. coccinea*. This species blooms between June and July in nature. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, or on Brazilian tree fern (xaxim). It is probably best not to use open types of hard tree fern. It may also be potted in a fine bark mix or high grade New Zealand *Sphagnum* moss. *Temperature* intermediate, but it tolerates extremes of 32 °C (90 °F) and to 7 °C (45 °F). *Light* bright shade. *Watering* keep moist, well drained, not wet. Plants will tolerate drying out for brief periods. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: Somewhat warmer growing than *Cattleya coccinea*, it is recommended that the intermediate growing conditions of *C. wittigiana* be adhered to. This is one of two species in the *Sophranitis* group with flower stems greater in length than the length of the leaves; the other being the rather different *C. dichroma*. The elegant *C. wittigiana* comes in several extremely rare colour forms, including whitish, blue, milky yellow and yellow. Some prized clones of this species produce flowers of excellent form, but these are difficult to find and can be quite expensive. *Cattleya wittigiana* tends to bloom in early summer or autumn to midwinter in cultivation. A wonderful addition to any miniature collection, this enchanting species is a superb subject for those with intermediate growing conditions.



Figure 4.294 (above) *Cattleya wittigiana* 'Pinko' is one of a number of different colour forms available to horticulturists (Grower: Larry Moskovitz).

Centroglossa Barb.Rodr.

Publication: Barbosa Rodrigues, J., 1882, *Gen. Spec. Orchid.* 2: 234

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Oncidiinae (formerly *Ornithocephalinae*)

Type species: *Centroglossa tripollinica* (Barb.Rodr.) Barb.Rodr., 1882, *Gen. Spec. Orchid.* 2: 235.

Etymology: From the Greek *kentron* (spur) and *glossa* (tongue), referring to the form of the spur.

Profile: A genus of five epiphytic species, the majority occurring in eastern Brazil and one species also found in Peru. The plants are found in scrubby and wet forests at elevations between 600–1800 meters altitude, with most species confined to the Mata Atlântica.



Figure 4.295 (above) *Centroglossa macroceras* forms dense growths that may be festooned with blooms when in flower (Grower: Steve Beckendorf).

CENTROGLOSSA

Centroglossa macroceras Barb.Rodr.

Publication: *Gen. Spec. Orchid.* 2: 235 (1882)

Etymology: From the Latin *macro* (large) and Greek *keras* (horn-like), with reference to club-shaped spur.

Morphology: *Plant* to 4 cm tall (individual growth), clumping, branching, fan-like, erect to pendent. *Pseudobulb* much reduced, 0.4 cm long by 0.3 cm wide, ovoid to subglobose, subtended and partially obscured by up to four distichous, imbricate leaf-like bracts, leaf apical, unifoliate. *Leaf* to 4 cm long by 0.3 cm wide, shortly petiolate, conduplicate, linear, ligulate to narrowly oblong, apex acute, lamina straight to arcuate, erect to slightly spreading, fleshy, leathery. *Inflorescence* a sub-umbellate raceme, short (to 1 cm), suberect to pendent, slender, lateral from base of pseudobulb. *Flower* 0.8–1 cm long in profile, including spur, 0.7–0.8 cm wide, proportionately large, 2–5 in number, occasionally more, simultaneous, resupinate, not-spreading widely, campanulate, lip proportionately huge, saccate, with green keels, faintly serrated on edge, spur clavate, upward curving, 0.4–0.6 cm long.

Range, elevation and habitat: *Centroglossa macroceras* is endemic to the Mata Atlântica in Brazil (states of Minas Gerais, Rio de Janeiro and São Paulo, with a range extension discovered by one of the authors in Espírito Santo) at elevations of 800–1000 m. It grows epiphytically in moist, mossy, montane forest at low to mid-level on trees, with dappled light and low air movement, often near water courses. In Espírito Santo, it was found growing with small bromeliads and *Campylocentrum* sp. on fallen trees. This species blooms during spring in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, or possibly Brazilian tree fern (xaxim). It may also be potted in a fine bark mix or in New Zealand *Sphagnum* moss. *Temperature* intermediate to intermediate-cool; winters to 11 °C (52 °F) at night and to 24 °C (75 °F) in the day. *Light* medium shade. *Watering* moist, but drying briefly between watering. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: Each crystalline, sparkling white and proportionately large flower has an unusual, sac-like lip with a cute, stubby, upturned spur. Be sure to look inside the flower to see the intricate green veining on the interior surface of the lip. *Centroglossa macroceras* is the most commonly available species of the genus, and it blooms in cultivation from early winter to late spring. It can make an incredible specimen when grown well. In 1997, a plant grown by Marni Turkel of Santa Rosa, California, won best plant in show at the San Francisco Orchid Society show with 160 flowers and 12 buds! This highly collectible, must-have species is relatively obtainable.



Figure 4.296 (above) *Centroglossa macroceras* growing as an epiphyte in nature (Photo: Leonardo Desordi Lobo).



Figure 4.297 (above) *Centroglossa macroceras* coming into bloom, Espírito Santo, Brazil (Photo: Mary Gerritsen).



Figure 4.298 (above) A mass of flowers produced by a mounted plant of *Centroglossa macroceras* (Grower: Steve Beckendorf).
Figure 4.299 (below) Three *Centroglossa macroceras* blooms in detail (Grower: Cindy Hill).

Ceratocentron Senghas

Publication: Senghas, K., 1989, *Orchidee (Hamburg)* 40: 89

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Aeridinae

Type species: *Ceratocentron fessellii* Senghas, 1989, *Orchidee (Hamburg)* 40: 90.

Etymology: From the Greek *keratos* (horn, horn-shaped) and *kentron* (spur) referring to the solid horn that is the front of the spur.

Profile: This monotypic genus is endemic to the Philippines on the island of Luzon. The description of this monopodial epiphyte is addressed within the species entry.

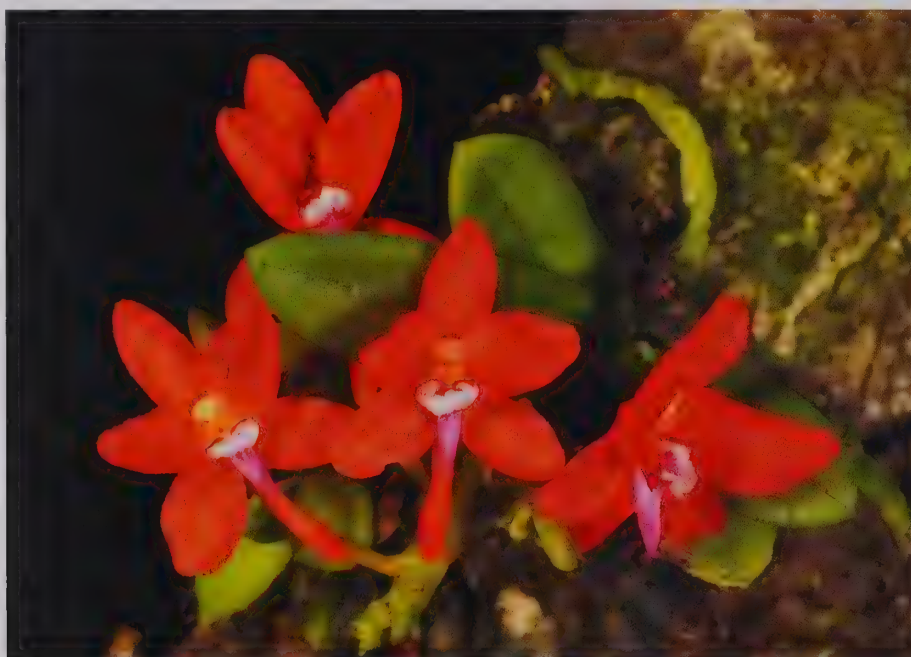


Figure 4.300 (above) A tetrad of *Ceratocentron fessellii* blooms (Grower: Purificacion Orchids).

Figure 4.301 (below) A more orange form of *Ceratocentron fessellii* (Grower: White Oak Orchids).

CERATOCENTRON

Ceratocentron fessellii Senghas

Publication: *Orchidee (Hamburg)* 40: 90 (1989)

Etymology: Named for Dr. Hans Fessel, German orchid taxonomist and botanist.

Heterotypic synonym: *Tuberolabium calcaratum* T. Hashim.

Morphology: *Plant* to 2.5 cm tall by up to 6.5 cm wide (to 1.5 cm tall by 4 cm wide in nature), erect, leaves distichous, 2–6 in number, roots proportionately large, few in number. *Leaf* to 3.2 cm long by up to 1.8 cm wide, conduplicate at base, elliptic, apex obtuse to nearly rounded, spreading, very thick, leathery, fleshy. *Inflorescence* a raceme, 1–3 simultaneous inflorescences, 1–3 cm long, slightly ascending to descending, axillary. *Flower* to 1.5 cm long (in profile, including spur) by up to 1 cm wide, 3–5 in number (occasionally more), simultaneous, spreading widely, resupinate, crystalline in texture, pedicel often spotted with red. Flowers vary in colour from light orange to red orange, rarely canary yellow.

Range, elevation and habitat: Endangered due to over-collection, *Ceratocentron fessellii* is endemic to a very small area on the Philippine island of Luzon, in the provinces of Nueva Ecija and Nueva Viscaya at elevations between 1000–1200 m. It grows as an epiphyte in wet montane forests with high humidity and constant air movement, favouring exposed situations on tree trunks and upright branches, often in deep, obscuring moss. It is sometimes found growing with *Amesiella minor*. *Ceratocentron fessellii* blooms between December and March in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a pad of New Zealand *Sphagnum* moss around the roots. It may also be potted in an open, fast-draining bark mix or in moss. *Temperature* intermediate to intermediate-warm. *Light* bright diffuse to bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* occasionally by division or seed.

Comments: A very pretty subject for miniature orchid collectors, even experienced growers can find this species challenging to keep alive in the long term. *Ceratocentron fessellii* blooms in the winter to mid-spring as well as in mid to late summer in cultivation. It has attractive, brightly coloured flowers that are crystalline in texture, offset by a tiny white lip with a rosy red spot. When this species was first available in the trade, it was known by the unpublished name of *Hymenorchis javierae*. It can be found growing with *Amesiella minor* in the wild and is vegetatively very similar to that species. There is a rare yellow colour form of this species. A precocious bloomer, the flowers last from 7 to 10 days. Based on the brightly coloured flowers and spur, the late taxonomist, Eric Christenson, suggested that this species was possibly bird-pollinated.



Figure 4.302 (above) The pretty *Ceratocentron fessellii* can be challenging to maintain (Grower: White Oak Orchids).

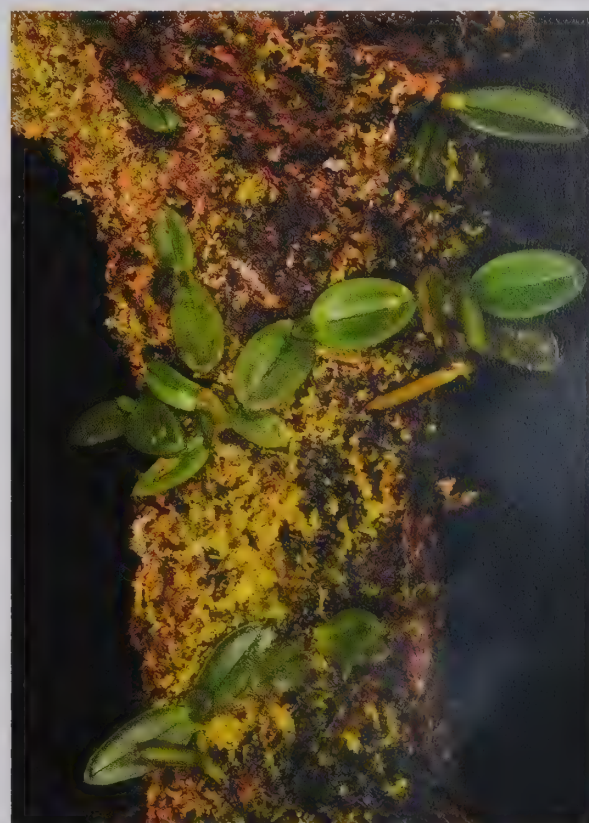


Figure 4.303 (above) *Ceratocentron fessellii* plants growing on a branch originally found in nature (Grower: Jun Golamko).

Ceratochilus Blume

Publication: Blume, K. L. von, 1825, *Bijdr.*: 358

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Aeridinae

Type species: *Ceratochilus biglandulosus* Blume, 1825, *Bijdr.*: 358.

Etymology: From the Greek *keratos* (horn, horn, horn-shaped) and *cheilos* (lip), referring to the large, sac-like spur on the lip.

Profile: This monotypic genus is endemic to the Indonesian island of Java. The description of this monopodial epiphyte is addressed within the species entry.

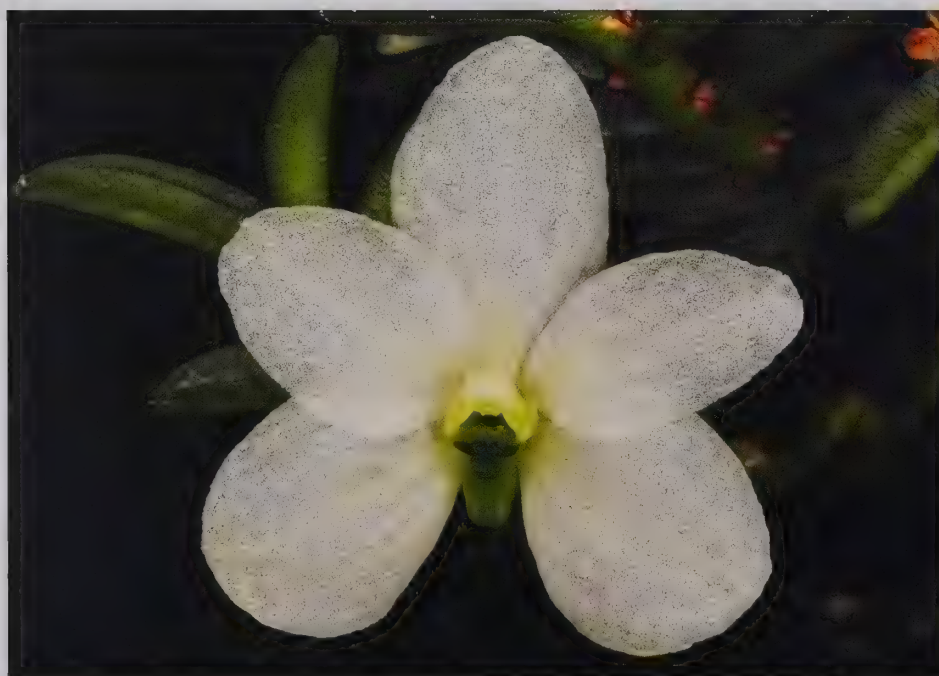


Figure 4.304 (above) Blooms of the Javan *Ceratochilus biglandulosus* (Grower: Mary Gerritsen).

Figure 4.305 (below) *Ceratochilus biglandulosus* flower detail (Grower: Ron Parsons).

CERATOCHILUS

Ceratochilus biglandulosus Blume

Publication: *Bijdr.*: 358 (1825)

Etymology: From the Latin *bi* (two) and *glandulosus* (covered with glands), possibly referring to the form of the lip.

Morphology: *Plant* to 14 cm long and up to 3 cm wide, pendent, apex often upturned, leaves distichous, stem rooting as it elongates. *Leaf* to 1.5 cm long by up to 0.5 cm wide, conduplicate, shortly lanceolate, apex acute, lamina subtriquetrous, ventral side strongly keeled, fleshy, leathery, rugose, dark green with reddish spotting. *Inflorescence* a raceme, very short, 2–3 inflorescences open simultaneously, axillary, distal. *Flower* 2.5–4 cm tall, proportionately large, single, spreading to widely spreading, lip with a large sac-like spur, segments crystalline in texture, spur to 0.2 cm, very long lasting, aging pink. Flowers vary noticeably in shape, size and width of segments.

Range, elevation and habitat: Endemic to Java, Indonesia, this species is widespread and relatively common, particularly in the eastern half of the island. It grows at elevations of 1000–2000 m, but is most commonly found between 1500–1700 m. *Ceratochilus biglandulosus* grows as an epiphyte on the smaller exposed branches and twigs of moss and lichen covered isolated trees in montane grasslands. It may bloom throughout the year.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using a small pad of New Zealand *Sphagnum* moss at the base. This species is not suited to pot culture. *Temperature* intermediate to cool. *Light* bright diffuse. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 strength weekly.

Comments: The authors regard this species as a must-have for those with the proper growing conditions. Stunning when in bloom, *Ceratochilus biglandulosus* has proportionately large, white flowers that are surprisingly long lasting at up to 2 months or more. The flowers have a delicate appearance and sparkling texture, turning to a lovely rosy-red colour as they age. This species dislikes warm temperatures and is a choice, relatively obtainable species for those with cooler growing conditions.

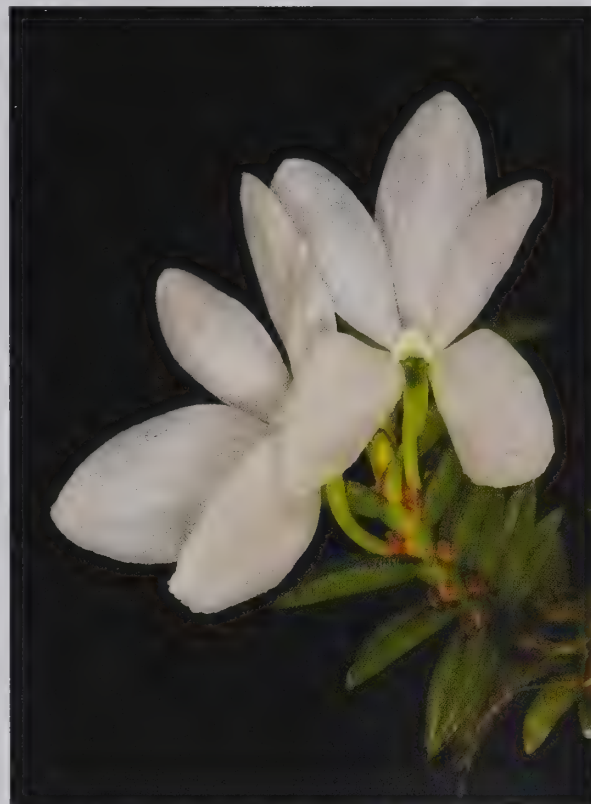


Figure 4.306 (above) The leaves and flowers of *Ceratochilus biglandulosus* (Grower: White Oak Orchids).



Figure 4.307 (above) Flowers of *Ceratochilus biglandulosus* may persist for over 2 months (Grower: Cindy Hill).

Ceratostylis Blume

Publication: Blume, K. L. von, 1825, *Bijdr.*: 304

Subfamily: Epidendroideae

Tribe: Podochileae

Subtribe: Eriinae

Etymology: From the Greek *keratos* (horn) and *stylis* (pillar), a reference to the horn-like column.

Type species: *Ceratostylis graminea* Blume, Averyanov, L. V., 1991, *Bot. Zhurn. (Moscow & Leningrad)*, 76(1): 126, and Cribb, P. J., 2005, *Gen. Orch.*, 4: 546.

Heterotypic synonyms: *Macrotis* Breda, *Ritaia* King & Pantl.

Profile: A widespread tropical genus of over 150 species, ranging from India and southern China to New Guinea and the islands of the Pacific Ocean. They are found in lowland, lower and upper montane forests, as well as in subalpine scrub to 3130 m.

General plant morphology: Sympodial, epiphytic, clumping or trailing. *Pseudobulb* narrow, short to elongate, barely differentiated from leaf, unifoliate. *Leaf* terete to linear-oblongate. *Inflorescence* terminal. *Flower* single, tubular, barely open to widely spreading, sepals and petals free, subsimilar, lip unlobed to three-lobed, callus absent or minimal, column short, bilobed at apex, with or without foot, pollinia 8.



Figure 4.308 (above) *Ceratostylis eria* is an attractive little species found in Peninsular Malaysia (Grower: Cordelia Wong).

CERATOSTYLIS

Ceratostylis philippinensis Rolfe ex Ames

Publication: *Orchidaceae* 1: 79 (1905)

Etymology: The toponym *Philippines* plus the Latin suffix *-ensis* (of, from), meaning from the Philippines.

Morphology: *Plant* clumping, creeping, mounding, becoming pendent, pseudobulbs spaced to 1 cm apart, rhizome ascending or descending. *Pseudobulb* to 1 cm long by 0.1–0.15 cm wide, narrow, terete, enveloped in reddish scarious bracts, leaf apical, unifoliate. *Leaf* 2–4 cm long by 0.1–0.15 cm wide, narrowly linear (almost needlelike), apex acute, lamina erect to suberect, nearly terete, sulcate on dorsal surface, leathery, rigid. *Inflorescence* a raceme, less than 1 cm long, terminal. *Flower* 0.8–0.9 cm, single, resupinate but randomly orientated, spreading, campanulate, crystalline texture, fragrant.

Range, elevation and habitat: A species that occurs throughout the Philippines, *Ceratostylis philippinensis* grows in montane forests at elevations of 700–2100 m. It can be very common in some localities, where it may cover entire trees, but it is also be found as a twig epiphyte. This species may bloom in any season.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough shingles, or possibly tree fern. It may also be potted in a fine bark mix or moss in pots or baskets. Small pots should be used, but keep in mind that it may rapidly outgrow the pot. *Temperature* intermediate. *Light* bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.

Comments: One of the smallest available species in the genus, *Ceratostylis philippinensis* can grow to be an attractive specimen if left undivided. When in mass bloom, the features of this attractive plant make for a wonderful contrast; dark green, pine-needle like leaves and reddish brown bracts against the snowy-white flowers. Additionally, it has a pleasing fragrance. This species blooms in the spring to early autumn in cultivation.



Figure 4.309 (above) A *Ceratostylis philippinensis* specimen plant in full bloom (Grower: Marni Turkel).



Figure 4.310 (above) *Ceratostylis philippinensis* flower detail (Grower: Marni Turkel).

CERATOSTYLIS***Ceratostylis pleurothallis*** (E.C.Parish & Rchb.f.) Seidenf.**Publication:** *Opera Bot.* 62: 44 (1982)**Etymology:** From the Latin *pleuro* (ribs, edge, side of) and *thallis* (sprout) probably alluding to the resemblance of the plant and flowers to many small species in the genus *Pleurothallis*.**Homotypic synonyms:** *Eria pleurothallis* E.C.Parish & Rchb.f., *Pinalia pleurothallis* (E.C.Parish & Rchb.f.) Kuntze.**Morphology:** *Plant* creeping, branching, mat-forming, erect, pseudobulbs clustered, rhizome gradually ascending. *Pseudobulbs* tiny to very small, obscured in reddish, scarious bracts, leaf apical, unifoliate. *Leaf* to 2.2 cm long by 0.15 cm wide, petiolate, narrowly linear, apex acute, unequally bilobed, lamina triquetrous, leathery, fleshy, somewhat flexible. *Inflorescence* a raceme, much shorter than leaves, erect, villose, terminal. *Flower* to 0.6 cm wide, single, resupinate but randomly orientated, spreading, campanulate, crystalline textured, fragrant.**Range, elevation and habitat:** *Ceratostylis pleurothallis* grows in northern Thailand, Cambodia and Myanmar. The type specimen was collected by Reverend Parish in the vicinity of Moulmein (Mawlamyine), Myanmar, apparently without elevational or habitat data. It blooms in July in Thailand. Conservation status unknown.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern. It may also be potted in moss or fine bark mix in small pots. *Temperature* intermediate, but keep above 16 °C (60 °F). *Light* bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed.**Comments:** Relatively uncommon in cultivation, *Ceratostylis pleurothallis* has cute little flowers with attractive striping at the base of the sepals, a bright yellow lip and an overall habit reminiscent of a pleurothallid. The subtly and pleasingly fragrant flowers are borne on very short inflorescences and often appear mid-summer to early autumn in cultivation. It is hoped that this species will become more available in the future, as it is one of the most charming miniatures in this genus.**Figure 4.311 (above)** Pretty *Ceratostylis pleurothallis* flowers nestle amongst the leaves of the plant (Grower: Marni Turkel).**Figure 4.312 (above)** This *Ceratostylis pleurothallis* has slightly different markings (Grower: Andy's Orchids).**Figure 4.313 (facing page)** The fine flower of *Ceratostylis pleurothallis*, a species that is currently uncommon in cultivation (Grower: Marni Turkel).





Chiloschista Lindl.

Publication: Lindley, J., 1832, *Edwards's Bot. Reg.* 18: t. 1522

Subfamily: Epidendroideae
Tribe: Vandeae
Subtribe: Aeridinae

Type species: *Chiloschista usneoides* (D. Don) Lindl., 1832, *Edwards's Bot. Reg.* 18: t. 1522.

Etymology: From the Greek *cheilos* (lip) and *schistos* (cleft) in reference to the deep cleft in the lip.

Profile: A genus of approximately 20 epiphytic species, ranging from India through tropical Asia to the Pacific Islands and Australia.

General plant morphology: Monopodial, epiphytic, small, from stemless to having a very abbreviated central stem, usually single, rarely branching, leaves few to none, quickly deciduous, roots greenish grey, photosynthetic, subcylindrical to somewhat flattened. *Leaf* when present, small, oblong-elliptic, apex bidentate. *Inflorescence* a raceme, sometimes paniculate, horizontal to descending, multiflowered, peduncle glabrous to pilose, bracteate, axillary but appearing terminal due to lack of leaves. *Flowers* small, often showy, widely spreading, simultaneous, resupinate, sepals and petals subsimilar, ovate, lateral sepals often joined to the column foot, lip three-lobed, usually saccate, the lateral lobes erect, conspicuous, the mid-lobe often reduced to a transverse ridge, usually pubescent, callus a pubescent cushion or erect and tongue-like, column, short, semi-terete, with a long foot, pollinia 4.

Comments: It is nearly impossible to differentiate members of this genus to the species level when plants are out of bloom. Even then, identification of plants in this genus at the species level is confusing and problematical. It can be very difficult to impossible to distinguish many of the species based on photographs alone, and dissection is usually required to make a definitive identification (the late Eric Christenson, pers. comms., 2011). Topical literature is scant, and what is available is perplexing. Moreover, herbarium specimens are often misidentified and records for the country of origin may not always be correct. At this stage, it would not be an exaggeration to suggest that most species available for purchase have the potential to be incorrectly named. However, all *Chiloschista* species are highly collectible; the attractive flowers are full, intricate, and interestingly marked.

General cultivation notes: *Substrate* mount on cork bark, rough-barked hardwood or rough wood shingles; tree fern is probably unsuitable. Not suited to pot culture, *Chiloschista* species have been seen in collections in tiny teak baskets with no potting media. They also grow in folded wire or plastic mesh, or on flat pieces of hardware cloth (galvanised steel mesh) with a moss pad, the many roots tending to hang free in the air. *Temperature* warm to intermediate. *Light* bright shade. *Watering* keep moist, well drained, not wet. Allow to dry fully but briefly between waterings, slightly drier in the winter. *Humidity* high. *Air movement* good. *Propagation* by seed, very rarely by division. *Fertilise* at 1/4 strength weekly while roots are in active growth.

CHILOSCHISTA

Chiloschista exuperei (Guillaumin) Garay

Publication: *Bot. Mus. Leafl.* 23: 166 (1972)

Etymology: Uncertain, but possibly a commemorative name based on the French surname Exupéry.

Homotypic synonym: *Taeniophyllum exuperei* Guillaumin.

Morphology: *Plant* see genus account. *Inflorescence* a raceme, to 8 cm long, descending to pendent, densely pubescent, flowers semi-congested. *Flower* to 1 cm wide, several to many in number, lip not pouch like, well developed protruding mid-lobe, central callus of mid-lobe backwards facing, lateral lobes erect, incurved, inside of lateral lobes striped reddish brown to brownish purple, flowers whitish, unspotted.

Range, elevation and habitat: This species is known from Thailand and Vietnam, where it occurs at elevations of 750–900 m. A rare epiphyte, it grows in dense broadleaf forest, often amongst short mosses, and in stunted forest on mountain tops. It is threatened by over-collection.

Culture recommendations: See general guidance for the genus.

Comments: One of just a few nearly white *Chiloschista* species, it is also one that is easy to identify. It cannot be confused with any other species due to the lack of a sac-like lip and the unusual, well developed protruding mid-lobe. *Chiloschista exuperei* is seen occasionally in collections, usually mislabelled or without a specific name. A desirable species like most of its genus, it tends to bloom in spring to early summer in cultivation.



Figure 4.315 (above) An inflorescence of *Chiloschista exuperei* bearing several open blooms (Grower: Mary Gerritsen).



Figure 4.316 (above) *Chiloschista exuperei* flower detail (Grower: White Oak Orchids).

CHIOSCHISTA

Chiloschista lunifera (Rchb.f.) J.J.Sm.

Publication: *Orch. Java*: 553 (1905)

Etymology: From the Latin *luna* (moon) and suffix *-ifera* (producing, bearing), probably referring to the typically dark flowers with crescent-shaped, light-coloured margins.

Homotypic synonyms: *Thrixspermum luniferum* Rchb.f., *Sarcochilus luniferus* (Rchb.f.) Benth. ex Hook.f.

Heterotypic synonyms: *Chiloschista indica* J.J.Sm., *Chiloschista javanica* Schltr.

Morphology: *Plant* see genus account. *Inflorescence* a raceme, 7.5 to cm long, lax, suberect to descending, pubescent, flowers semi-congested. *Flower* 1–1.6 cm wide, several to many in number, usually simultaneous, resupinate, widely spreading, sepals and petals not hairy on outer surface except for a few stiff hairs, petals often slightly reflexed with short stiff hairs along the often somewhat erose edges, segments usually brown to dark reddish-brown or maroon, or very rarely orangey in colour with whitish to yellowish crescent-shaped margins, lip pouch-like.

Range, elevation and habitat: There is some confusion as to the range of this species. Seidenfaden (1988) indicates that *Chiloschista lunifera* is a rare plant from Thailand, Myanmar (Tenasserim) and Laos at elevations of 560–800 m, and that the flowers are brown with yellow-edged sepals. The Kew Monocot list states the range of *Chiloschista lunifera* as India (Sikkim), Nepal, Myanmar, Laos, northern Thailand, and Java. The authors believe that the thorough work of the late Seidenfaden is more likely to be correct in this regard. Habitat information is unknown.

Culture recommendations: See general guidance for the genus.

Comments: As noted above, there is conflicting information about the range of this species. There are also differing descriptions of the flowers. *Chiloschista lunifera* has dark, purplish brown petals and sepals with lighter coloured, lunate margins, yet Hawkes (1965) states that the flowers are yellow, spotted with purple, and that it occurs from India (Sikkim) to Burma. Based on Hawkes description, the authors believe that the plants he describes are *Chiloschista parishii* or a similar species. The lovely flowers of *Chiloschista lunifera* are among the most distinctive in the genus, although they may be confused with those of *C. ramifera*; that species has similarly coloured and patterned flowers that bloom in a large panicle, and its roots, peduncle and rachis are apparently purple. *Chiloschista lunifera* tends to bloom in the spring to early summer in cultivation.



Figure 4.317 (above) The distinctive, darkly coloured flowers of *Chiloschista lunifera* (Grower: Mary Gerritsen).

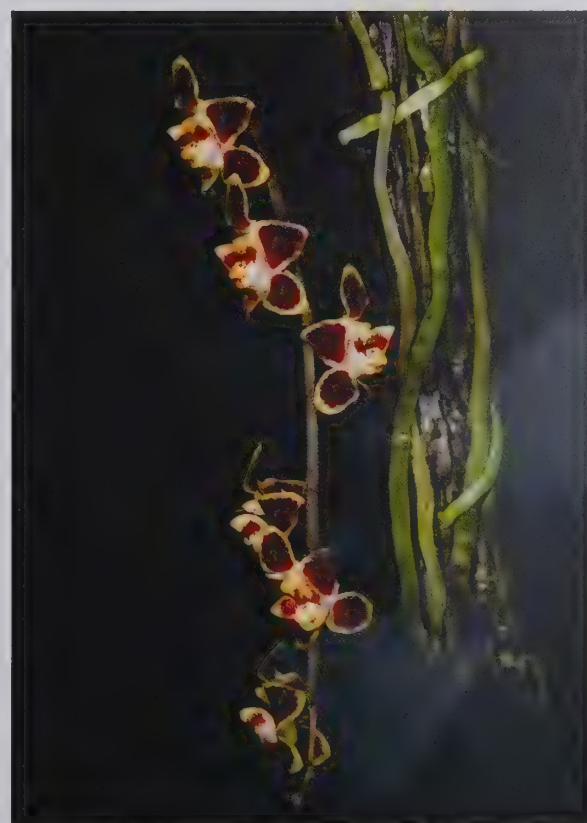


Figure 4.318 (above) *Chiloschista lunifera* flowers and roots supported by a mount (Grower: Andy's Orchids).

CHILOSCHISTA

Chiloschista parishii Seidenf.

Publication: *Opera Bot.* 95: 176 (1988)

Etymology: Named in honour of Rev. Charles Samuel Pollock Parish (1822–1897), collector and authority of orchids in Burma (now Myanmar), who discovered this species.

Morphology: *Plant* see genus account. *Inflorescence* a raceme, 7.5–37.5 cm long (rachis 4.5–30 cm, peduncle 3–7.5 cm), descending to pendent, weakly fractiflex, pubescent, flowers sub-secund, semi-congested towards apex. *Flower* 0.9–1.2 cm wide, few to many in number, resupinate, widely spreading, sepals and petals yellow, darkly spotted, petals often slightly reflexed at base and not ciliate along margins, lip pouch-like, anther with filiform lateral appendages.

Range, elevation and habitat: *Chiloschista parishii* is an uncommon epiphytic species that grows in montane seasonal forest in India (Northeast India and Sikkim), eastern central Nepal, Bhutan, Myanmar, Thailand and Vietnam. It occurs at elevations of 1500–2000 m, but at substantially lower elevations of 120–600 m in Thailand. It blooms in January to May in nature.

Culture recommendations: See general guidance for the genus.

Comments: With bright yellow flowers covered in dark spotting, *Chiloschista parishii* is one of the most attractive, as well as obtainable, species in the genus. *Chiloschista sweetlimii* is very similar, but differs primarily by its relatively high, broadly triangular side-lobes, larger and denser spotting, and the darker yellow background of the flowers. This species tends to bloom in the spring to early summer in cultivation.



Figure 4.319 (above) The flowers of *Chiloschista parishii* are attractively spotted (Grower: Howard Gunn).



Figure 4.320 (above left) A specimen of *Chiloschista parishii* blooms *in situ* near Kalimpong, Teesta River Valley, Sikkim (Photo: Mike Duncan).

Figure 4.321 (above right) Numerous *Chiloschista parishii* inflorescences hang prettily from a vertical mount. The identity of this specimen was confirmed by the late Eric A. Christenson, Ph.D. (Grower: Howard Gunn).



Figure 4.322 (above left) *Chiloschista cf. parishii* photographed *in situ*, Lao Cai, North Vietnam (Photo: Leonid Averyanov).

Figure 4.323 (above right) A mass of *Chiloschista sweetlimii* flowers (Grower: Judy Carney).

Figure 4.324 (below) Detail of a *Chiloschista sweetlimii* bloom (Grower: Judy Carney).

CHILOSCHISTA

Chiloschista usneoides (D. Don) Lindl.

Publication: *Edwards's Bot. Reg.* 18: t. 1522 (1832)

Etymology: Resembling *Usnea* (a genus of lichens), referring to the numerous, randomly spreading roots.

Homotypic synonyms: *Epidendrum usneoides* D. Don, *Sarcochilus usneoides* (D. Don) Rchb.f., *Thrixspermum usneoides* (D. Don) Rchb.f.

Morphology: *Plant* see genus account. *Inflorescence* a raceme, 2–3 cm long (rachis 1.5–2.1 cm, peduncle relatively short), pendent, pubescent, flowers sub-second. *Flower* 0.8–1.3 cm wide, 4–5 in number, sepals and petals pure white, sometimes pale pinkish; lip pouch-like, three-lobed, with small pubescent mid-lobe, notched at apex, much broader than long, callus consisting of pubescent longitudinal keel terminating in a globose boss, fragrant.

Range, elevation and habitat: *Chiloschista usneoides* grows as an epiphyte or lithophyte in the northwest Himalayas and Northeast India (Sikkim), Nepal, Bhutan and possibly northern Thailand. A rare species, it is found at 700–1830 m elevation. In India it blooms in February to March.

Culture recommendations: See general guidance for the genus.

Comments: Although *Chiloschista usneoides* is the type for the genus, correct identification of plants is often inexplicably confused. The relatively distinctive greenish to whitish flowers have a small, pouch-like lip whereas the only truly similar species, *C. exuperei*, has an open lip with a tongue-shaped mid-lobe. At one time more frequently seen in collections, *C. usneoides* is a species that should still be sought out. It tends to bloom in the spring to early summer. Seidenfedan (1988b) stated that the occurrence of this species in Thailand was highly doubtful.



Figure 4.325 (above) The flowers of *Chiloschista usneoides* (Grower: Marni Turkel).

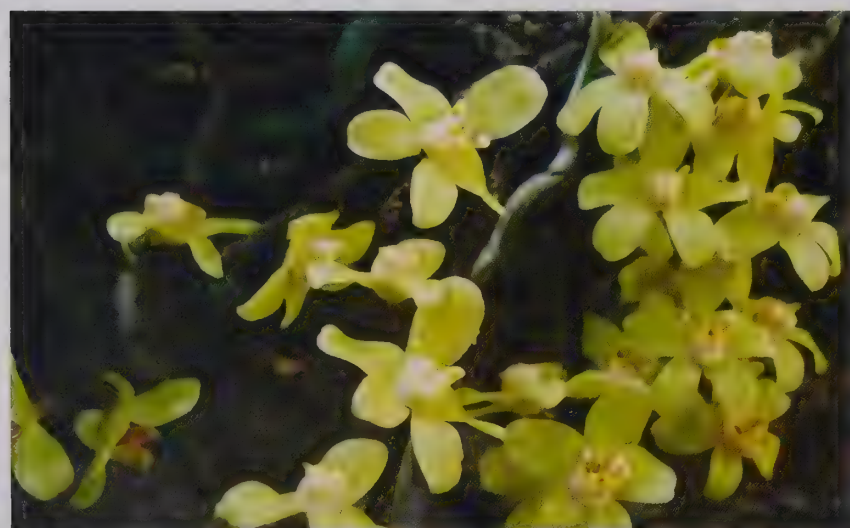


Figure 4.326 (above) *Chiloschista usneoides* photographed in *Alnus nepalensis* forest, central Nepal, at 1400 m elevation (Photo: Bhakta Bahadur Raskoti).

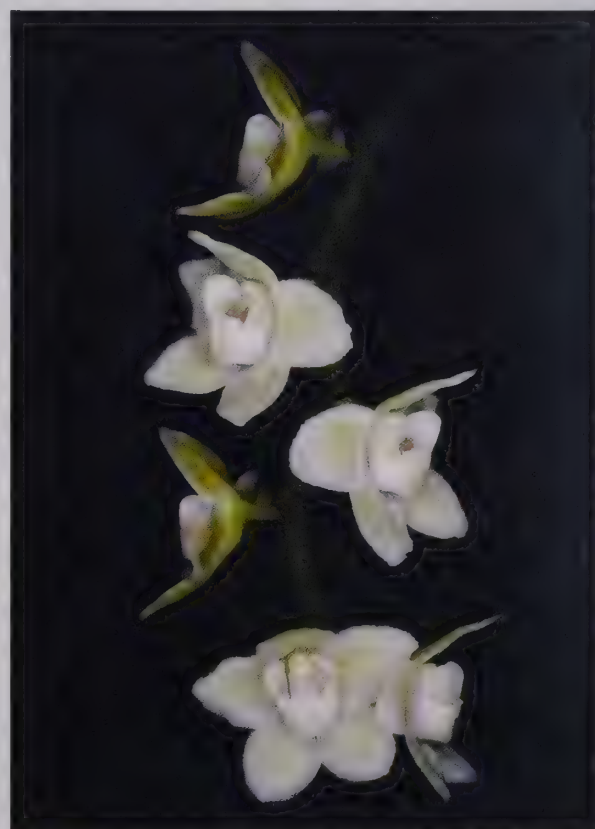
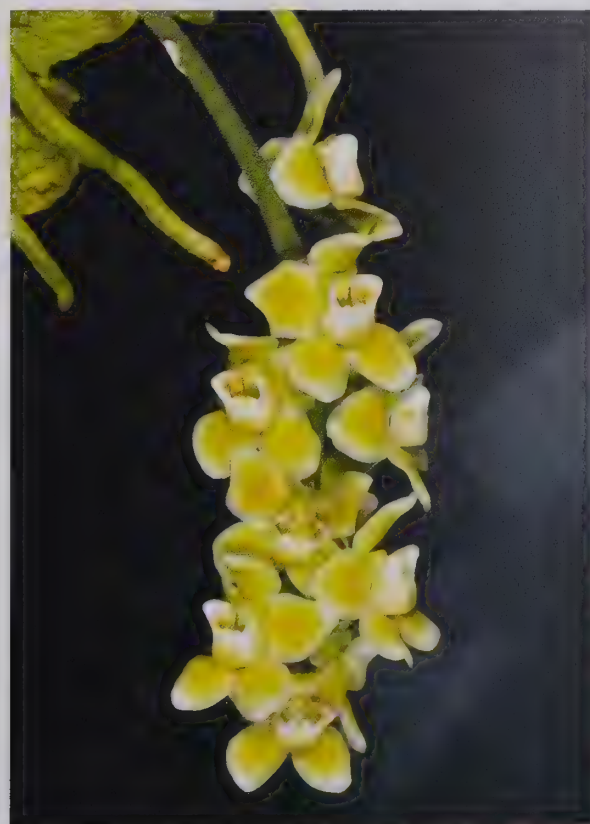


Figure 4.327 (above) Blooms of *Chiloschista* cf. *usneoides* in cultivation (Grower: Marni Turkel).

CHILOSCHISTA***Chiloschista viridiflava*** Seidenf.**Publication:** *Opera Bot.* 95: 175 (1988)**Etymology:** From the Latin *viridis* (green) and *flavus* (yellow), a reference to the flower colour.**Morphology:** *Plant* see genus account. *Inflorescence* a raceme, to 12 cm, occasionally longer, flowers sub-secund, pubescent. *Flower* 1–1.5 cm wide, several in number, widely spreading to petals slightly reflexed at base, segments nearly circular, greenish yellow, petal margins minutely erose, lip white, sometimes with few, light reddish brown blotches on exterior and on inner side-lobes, pouch-like with small mid-lobe (much smaller than lateral lobes), callus with two, apical, globose pubescent bosses. Flowers vary from entirely greenish yellow to greenish yellow with a white margin, sometimes with dense, bright yellow spotting at base of segments.**Range, elevation and habitat:** *Chiloschista viridiflava* is thought to be endemic to Thailand. No habitat or elevation information could be found. Its conservation status is unknown.**Culture recommendations:** See general guidance for the genus.**Comments:** Although the Kew Monocot List gives the distribution of this species as Nepal and Thailand, it is likely that Seidenfaden (1988) was correct in stating that it is endemic to Thailand. The lovely colouration of *Chiloschista viridiflava* may be similar to forms of other species, but the species can be identified by the two fuzzy calli seen at the apex of the lip. A very attractive colour form is yellowish-green with dense, bright yellow spotting at the base of the segments, and a white margin. This species tends to bloom in the spring to early summer.**Figure 4.328 (above)** The green and yellow flowers of the aptly named *Chiloschista viridiflava* (Grower: Jacob Knecht).**Figure 4.329 (above)** *Chiloschista viridiflava* is believed to be endemic to Thailand (Grower: Jacob Knecht).

CHILOSCHISTA

Chiloschista yunnanensis Schltr.

Publication: *Repert. Spec. Nov. Regni Veg. Beih.* 4: 74 (1919)

Etymology: The toponym *Yunnan*, a province in southwest China, north of Vietnam, plus the Latin suffix *-ensis* (of or from), meaning from Yunnan.

Morphology: *Plant* see genus account. *Inflorescence* a raceme, 2–3 simultaneous inflorescences, unbranched, to 26 cm long, arching to pendent, pubescent, green spotted with purple, floral bracts ovate-lanceolate. *Flower* 1–1.2 cm wide, many in number, flowers dark yellowish to yellowish-greenish, sepals elliptic or ovate elliptic, with large brown patches on basal half only, petals spotted over most of their surface, lip pouch-like, trilobed, mentum small but distinct, column whitish, anther cap white or yellow.

Range, elevation and habitat: *Chiloschista yunnanensis* is endemic to China (western Sichuan and southern and southwestern Yunnan provinces), where it grows as an epiphyte on tree trunks at forest margins and in open forests, at elevations of 700–2000 m. This species blooms between March and May in nature.

Culture recommendations: See general guidance for the genus.

Comments: This species is infrequently seen in collections, but this may be in part due to confusion with similarly patterned species. If the large side-lobes are a typical feature (see photo), this should help in identification. This species tends to bloom in the spring to summer to early summer.



Figure 4.330 (above) Flowers of *Chiloschista yunnanensis*, a Chinese endemic (Grower: Marni Turkel).



Figure 4.331 (above) The pretty flowers of this *Chiloschista* cf. *yunnanensis* are liberally spotted with brown (Grower: Tim Legant).

Christensonella Szlach., Mytnik, Górniak & Smiszek

Publication: Szlachetko, D. L., Mytnik-Ejsmont, J., Górniak, M., & Smiszek, M., 2006, *Polish Bot. J.* 51: 57

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Maxillariinae

Type species: *Christensonella subulata* (Lindl.) Szlach., Mytnik, Górniak & Smiszek, 2006, *Polish Bot. J.* 51: 59 (*Maxillaria paulistana*).

Etymology: Named for the late orchid taxonomist, Dr. Eric A. Christenson (1956–2011), specialist in the *Aeridinae* neotropical orchids and a prolific author of more than 300 publications. He was working on a monograph of the *Maxillariinae* when he died, and was strongly opposed to the breakup of the large genus *Maxillaria*.

Profile: A genus of 12 epiphytic and lithophytic species from southeast Mexico through Central America to Peru, Bolivia and Argentina, although the majority of species are Brazilian.

General plant morphology: Often small, with most species having characteristic constrictions along their roots, pseudobulbs clumping to well spaced, erect to pendent. *Pseudobulb* often ridged, subtended by reddish, non-foliaceous bracts, leaves apical, 1–4 in number. *Leaf* sessile, erect to twisted, flat or conduplicate to subulate or cylindrical, leathery to fleshy, rigid to flexible. *Inflorescence* a single flowered raceme, usually two, sometimes more, lateral from base of pseudobulb. *Flowers* sepals and petals subsimilar, often campanulate, callus prominent, raised, often shiny, but dry, pollinia 2.

Comments: The flowers and plants of the species in this genus of former *Maxillaria* are highly polymorphic, and recent taxonomic studies have seen several well-known species reduced in rank; for example, *Christensonella cogniauxana* and *C. juergensii* have been subsumed into *C. paranaensis*, and *C. vernicosa* and *C. vitelliniflora* into *C. neowiedii*.



Figure 4.332 (above) Two different plant forms of *Christensonella neowiedii* almost entirely cover their mounts (Grower: Mary Gerritsen).

CHRISTENSONELLA

Christensonella neowiedii (Rchb.f.) S.Koehler

Publication: *Lankesteriana* 7: 522 (2007)

Etymology: Named in honour of Prince Maximilian (1782–1867) of Wied-Neuwied, German explorer, ethnologist and naturalist who led a pioneering expedition to southeast Brazil between 1815–1817. He wrote an account of his journey that was illustrated with engravings, representing subjects in natural history, local scenery and the inhabitants; this work was recognised as one of the most significant contributions to the knowledge of Brazil at the beginning of the 19th century.

Homotypic synonym: *Maxillaria neowiedii* Rchb.f.

Heterotypic synonyms: *Christensonella vernicosa* (Barb. Rodr.) Szlach., Mytnik, Górniak & Smiszek, *Christensonella vitelliniflora* (Barb. Rodr.) Szlach., Mytnik, Górniak & Smiszek, *Maxillaria neowiedii* var. *longifolia* Cogn., *Maxillaria vernicosa* Barb. Rodr., *Maxillaria vitelliniflora* Barb. Rodr.

Morphology: Plant 2–5 cm tall, clumping, tufting, much branching, rhizome slowly ascending, rhizome and base of pseudobulbs covered in brown, scarios bracts. *Pseudobulb* 0.5–1.3 cm long by 0.2–0.3 cm wide, narrowly ovoid, ridged, subtended by dried basal bracts, green to purplish brown, leaves apical, bifoliate. *Leaf* 1.2–4 cm long by 0.4–0.8 mm wide, needle-like (aciculate), apex acute, lamina suberect, straight, flexible, wiry to leathery. *Inflorescence* a raceme (pedicillate ovary), very short, lateral. Flower to 0.85 cm long, single, resupinate, spreading, campanulate, sepals and petals yellow, callus brown to yellow.

Range, elevation and habitat: A widespread species of the Mata Atlântica, *Christensonella neowiedii* occurs in the Brazilian states of Bahia, Minas Gerais, São Paulo, Rio de Janeiro, Paraná, Santa Catarina and Rio Grande do Sul at elevations between 200–1700 m. It is known to be common in Paraná. *Christensonella neowiedii* grows as an epiphyte on tree trunks and large branches in seasonally dry to wet forest. It blooms between spring and summer in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, or possibly hard tree fern. This species may be potted in a fine bark mix or New Zealand *Sphagnum* moss. However, it is better suited to mounting as this allows for plant growth with minimal disturbance. *Temperature* intermediate to cool. *Light* bright diffuse to bright shade. *Watering* moist, well drained, not wet, can dry slightly between waterings. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: This choice polymorphic miniature is quite floriferous, forming beautiful, tufted mounds of soft, wiry leaves, with cute yellow flowers tucked in just above the pseudobulbs. Although the authors have

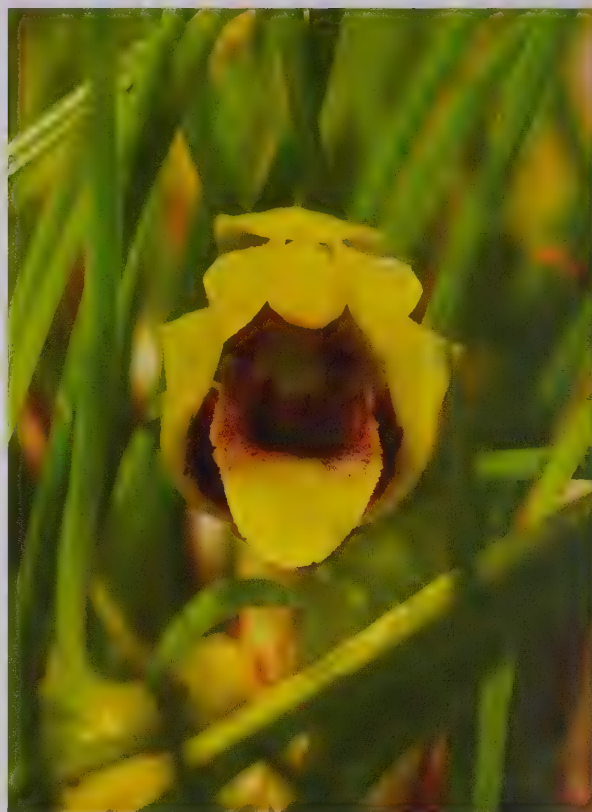


Figure 4.333 (above) The tiny, but perfectly formed flower of *Christensonella neowiedii* (Grower: Mary Gerritsen).



Figure 4.334 (above) Numerous *Christensonella neowiedii* blooms amongst the narrow leaves (Grower: Steve Kirby).

CHRISTENSONELLA

seen many examples of this species, all have represented either one or the other of two distinct forms.

One form has relatively long, flexible, wiry leaves, and flowers with brown at the base of the lip and lateral sepals. Curiously, it is commonly purchased mislabelled as *Christensonella (Maxillaria) seidelii*, a closely related, but distinct taxon with pinkish to white flowers now known as *C. echinophyta* (Barb. Rodr.) Szlach., Mytnik, Górniak & Smiszek.

The second, smaller form, often seen as *Christensonella vitelliniflora*, has smaller pseudobulbs (0.5 cm long by 0.25 cm wide), smaller and wider leaves (to 1.3 cm long by 0.1 cm wide) that are somewhat flexible, and slightly larger flowers (to 0.8 cm wide) that spread more widely. The flowers of this form are entirely yellow, but sometimes with faint to distinct darkish longitudinal lines on the basal half of the petals, and the petal apices either do not or just barely recurve.

Both forms bloom between early spring to mid summer in cultivation.



Figure 4.335 (above) A pair of *Christensonella neowiedii* blooms (Grower: Hanging Gardens).



Figure 4.336 (above) Clumps of *Christensonella neowiedii* in full bloom in their native Brazil (Photo: Leonardo Desordi Lobo).



Figure 4.337 (above) A mounted *Christensonella neowiedii* specimen plant forms a beautiful globe of leaves and flowers (Grower: Mary Gerritsen).
Figure 4.338 (below) Detail of the flowers and leaves of the same *Christensonella neowiedii* clone (Grower: Mary Gerritsen).

CHRISTENSONELLA

Christensonella paranaensis (Barb. Rodr.) Koehler

Publication: *Bot. J. Linn. Soc.* 168: 449 (2012)

Etymology: The toponym *Parana*, a state in Brazil, and the Latin suffix *-ensis* (of, from).

Homotypic synonym: *Maxillaria paranaensis* Barb. Rodr.

Heterotypic synonyms: *Christensonella cogniauxiana* (Hoehne) Szlach., Mytnik, Górniak & Smiszek, *Christensonella juergensii* (Schltr.) Szlach., Mytnik, Górniak & Smiszek, *Maxillaria acicularis* var. *brevifolia* Cogn., *Maxillaria spegazziniana* Kraenzl., *Maxillaria juergensii* Schltr., *Maxillaria cogniauxiana* Hoehne, *Maxillaria cogniauxiana* var. *longifolia* Hoehne, *Maxillaria heterophylla* Hoehne, *Maxillaria heterophylla* var. *acicularifolia* Hoehne, *Maxillaria heterophylla* var. *intermedia* Hoehne, *Maxillaria heterophylla* var. *latifolia* Hoehne, *Maxillaria heterophylla* var. *longifolia* Hoehne, *Maxillaria heterophylla* var. *magnifolia* Hoehne, *Maxillaria heterophylla* var. *pygmaea* Hoehne, *Maxillaria cogniauxiana* var. *intermedia* (Hoehne) Hoehne, *Maxillaria cogniauxiana* var. *latifolia* (Hoehne) Pabst, *Maxillaria cogniauxiana* var. *pygmaea* (Hoehne) Pabst.

Morphology: Plant 2.5–10 cm tall, clumping, creeping, much branching, forming drooping tufts, pseudobulbs clustered to spaced at short distances along rhizome, enclosed in sheaths. *Pseudobulb* 1.6–2.5 cm tall by 0.3–0.7 cm wide, oblong to conical, ridged, enclosed in scarious basal bracts, leaves apical, bifoliate. *Leaf* 1.1–8 cm long by 0.5–0.8 cm wide, lanceolate, subulate, apex sharply acute, acuminate, sometimes apiculate, lamina flat, erect, rigid, usually thinly leathery. *Inflorescence* a raceme (pedicillate ovary), 1.1–3.7 cm long, generally longer than pseudobulb, lateral. *Flower* 1.1–4.0 cm long, single, reddish brown to purplish brown, rarely



Figure 4.339 (above) A specimen of *Christensonella paranaensis* (as *Maxillaria cogniauxiana*) attractively presented on a suspended mount (Grower: Orchid Species Plus).

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pale yellow to tan, resupinate, spreading, campanulate, callus shiny, not fragrant.

Range, elevation and habitat: *Christensonella paranaensis* grows as an epiphyte or lithophyte in Bolivia (departments of Cochabamba, La Paz and Santa Cruz), southern and southeastern Brazil (states of Espírito Santo, Minas Gerais, Paraná, Rio Grande do Sul, Rio de Janeiro, Santa Catarina and São Paulo) and Argentina (province of Misiones) at elevations of 300–1800 m. It occurs at mid to high levels on tree trunks or undersides of branches, usually rooting only from the base of the plant, in moist montane forest to seasonally dry forest in exposed, bright, airy situations. The form known previously as *C. juergensii* is often found growing on *Podocarpus lambertii* in Brazil, and in Bolivia it has been found on fallen trunks of *Terminalia amazonica*.

Culture recommendations: *Substrate* mount on cork bark, rough barked hardwood or possibly hard tree fern. This species may be potted in a fine bark mix or New Zealand *Sphagnum* moss. However, it is best suited to mounting as this allows for growth with minimal disturbance. *Temperature* intermediate to cool. *Light* bright diffuse to bright shade. *Watering* moist, well drained, not wet, but can dry slightly between waterings. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: Until recently, *Christensonella cogniauxiana* and *C. juergensii* were regarded as separate taxa, but recent studies have determined that they are actually the same species. They have therefore been united, along with lesser known forms, under the new specific name *C. paranaensis*.

The plant formerly known as *Christensonella cogniauxiana* has reddish-brown flowers on slightly larger plants than those of the former *C. juergensii*, which has rather dark, purplish brown flowers.

Whatever their taxonomic status, all forms of *Christensonella paranaensis* are highly desirable due to their ease of culture, frequent branching, densely clumping habit and floriferous nature. They can be easily grown into specimen plants and put on a subtle, yet delightful display. In cultivation, this species tends to bloom in the spring.

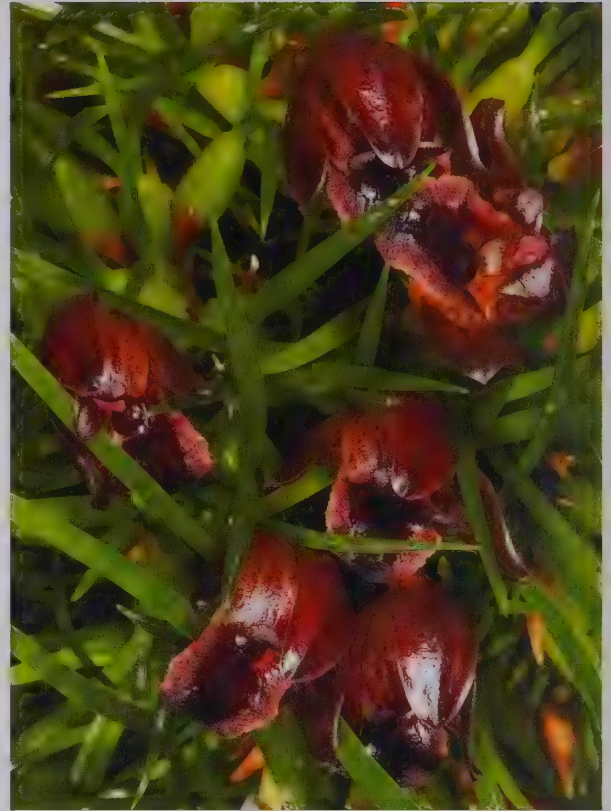


Figure 4.340 (above) The leaves and flowers of *Christensonella paranaensis* (as *Maxillaria juergensii*) (Grower: John Leathers).



Figure 4.341 (above) The compact growths of mature *Christensonella paranaensis* plants (Grower: Mary Gerritsen).



Figure 4.342 (above) *Christensonella paranaensis* (as *Maxillaria cogniauxiana*) plant and flower detail (Grower: Orchid Species Plus).

Figure 4.343 (below) Fine detail of the attractive *Christensonella paranaensis* bloom (Grower: Orchid Species Plus).

CHRISTENSONELLA

Christensonella pumila (Hook.) Szlach., Mytnik, Górniak & Smiszek

Publication: *Polish Bot. J.* 51: 58 (2006)

Etymology: From the Latin *pumilus* (dwarf, very small), referring to the diminutive form of the plant.

Homotypic synonym: *Maxillaria pumila* Hook.

Heterotypic synonyms: *Maxillaria funerea* Lindl., *Maxillaria plebeja* Rchb.f., *Maxillaria parva* Rolfe, *Maxillaria minuta* Cogn., *Maxillaria spannagelii* Hoehne, *Maxillaria minuta* var. *minor* Hoehne, *Christensonella minuta* (Cogn.) Szlach.

Morphology: Plant to 6 cm tall (individual growth), tufted, rhizome branching, slowly ascending, rooting at base. *Pseudobulb* to 1.5 cm long by 0.6 cm wide, narrowly ovoid to conical, ridged, green to blackish purple, enclosed in dried, brown papery bracts, leaf apical, unifoliate. *Leaf* to 4.5 cm long by 0.9 cm wide, linear-oblong to lanceolate, apex acute, lamina flat to slightly conduplicate, erect, thick, fleshy, rigid, leathery. *Inflorescence* a raceme, 0.3–1.3 cm long (including pedicillate ovary), erect, slender, lateral. *Flower* to 0.8 cm wide, single, resupinate, not spreading widely, upward facing, not fragrant.

Range, elevation and habitat: A common, mat-forming species from the Amazônia and Mata Atlântica phytogeographic zones of Brazil (states of Amapá, Amazonas, Rondônia, Minas Gerais, Espírito Santo, São Paulo, Rio de Janeiro, Paraná and Santa Catarina), and also Guyana, where the type was collected, and where it is very rare. *Christensonella pumila* occurs from near sea level to 800 m. It grows epiphytically at mid to low levels on tree trunks, and also lithophytically on rocks, in seasonally dry to wet lower montane forest. It blooms between February and March in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, or possibly hard tree fern. This species may be potted in a fine bark mix or New Zealand *Sphagnum* moss. However, it is better suited to mounting as this allows for growth of plants with minimal disturbance. *Temperature* intermediate. *Light* bright diffuse to bright shade. *Watering* moist, drying slightly and briefly between waterings. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: According to the Kew Monocot List, this species may also occur in Guyana. In cultivation, it blooms in the autumn, but also in late winter to early spring. A very attractive, tufted plant with thickened, needle-like leaves and ridged pseudobulbs. The small, brownish flowers are somewhat hidden at the base of the plant. Like its relatives, it is floriferous, easy to grow, and if left undivided, grows to specimen size quite quickly. It displays better mounted than when potted. This species is often labelled as *Maxillaria* (*Christensonella*) *minuta* or *Maxillaria* (*Christensonella*) *plebeja*.



Figure 4.344 (above) A pair of *Christensonella pumila* blooms (Grower: White Oak Orchids).

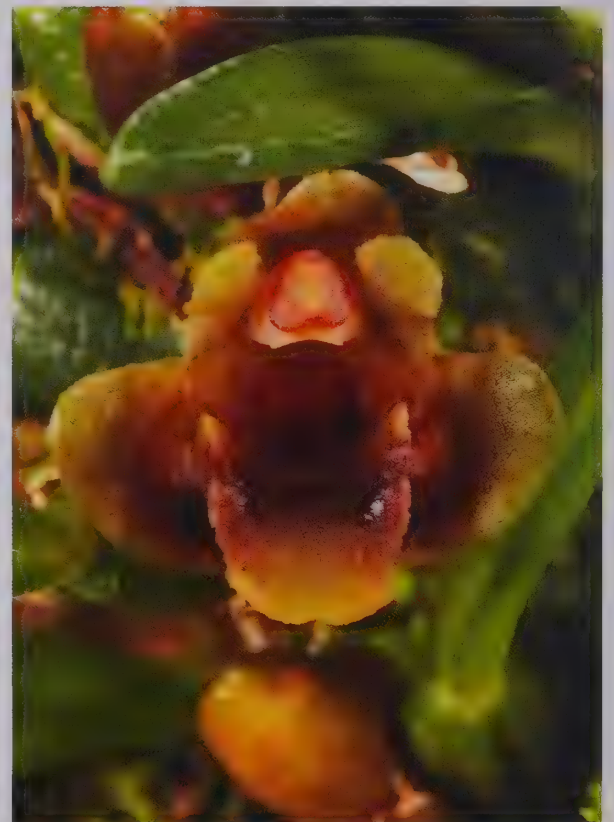


Figure 4.345 (above) *Christensonella pumila* is easily grown and flowers from late Autumn (Grower: White Oak Orchids).



Figure 4.346 (above) A handsome, mounted specimen of *Christensonella pumila* in flower (Grower: Ginette Sanchou).

Figure 4.347 (below) A darker flowered variety of *Christensonella pumila* (Grower: Howard Gunn).

CHRISTENSONELLA

Christensonella uncata (Lindl.) Szlach., Mytnik, Górniak & Smiszek

Publication: *Polish Bot. J.* 51: 59 (2006)

Etymology: From the Latin *uncata* (hooked), referring to the hooked lip.

Homotypic synonyms: *Maxillaria uncata* Lindl., *Camaridium uncatum* (Lindl.) Hoehne.

Heterotypic synonyms: *Camaridium squamata* (Barb. Rodr.) Hoehne, *Christensonella squamata* (Barb. Rodr.) Carnevali, *Maxillaria macleei* Bateman ex Lindl., *Maxillaria nana* Hook., *Maxillaria squamata* Barb. Rodr., *Maxillaria stenostele* Schltr., *Maxillaria striatella* Kraenzl., *Ornithidium nanum* Rolfe, *Ornithidium squamatum* (Barb. Rodr.) Barb. Rodr.

Morphology: Plant 3–8.5 cm tall, clumping, repent, branching profusely, mat-forming, initially erect to pendent as plant matures. *Pseudobulb* to 3 cm long by 0.2 cm wide, cylindrical to fusiform-cylindrical, enclosed in papery sheaths, leaf apical, unifoliate. *Leaf* 1.5–10 cm long by 0.2–2 cm wide, linear to oblong-lanceolate, apex acute, lamina flat to terete, sulcate, erect to slightly recurved, fleshy, rigid. *Inflorescence* a raceme, pedicellate ovary, to 2 cm long, erect, slender, lateral from base of pseudobulb. *Flower* to 1.5 cm long, single, not spreading widely to spreading, tubular to infundibuliform, not fragrant. The flowers vary in background colour from whitish, pale-yellow, to purplish, in the width of striping, and in the degree of openness.

Range, elevation and habitat: An extremely widespread and abundant species, *Christensonella uncata* occurs in Mexico (state of Chiapas), Guatemala (departments of Huehuetenango, Izabal and Peten, 70 m), Belize (districts of Belize, Cayo and Toledo), Honduras (departments of Atlántida and Cortés), Nicaragua (departments of Atlántico Norte, Boaco, Chontales, Granada, Jinotega, Nueva Segovia and Río San Juan), Costa Rica (Alajuela, Cartago, Guanacaste, Heredia, Limón, Puntarenas and San José), Panama (provinces of Bocas del Toro, Canal Area, Chiriquí, Coclé, Colón, Darién, Panamá, San Blas and Veraguas), Colombia (departments of Amazonas, Antioquia Chocó, Santander, Valle and Valle del Cauca), Ecuador (provinces of Bolívar, Guayas, Morona-Santiago, Napo, Pastaza, Sucumbíos and Zamora-Chinchipe), Peru (department of Loreto), Bolivia (departments of Pando and La Paz), Venezuela (states of Amazonas, Bolívar and Zulia), French Guiana (arrondissements of Cayenne and Saül), Guyana (regions of Barima-Waini, Cuyuni-Mazaruni, Upper Demerara-Berbice, Upper Takutu-Upper Essequibo, Pomeroon-Supenaam, and Potaro-Siparuni), Suriname (districts of Brokopondo and Wilhelmina Geberte), Brazil (states of Roraima, Amapá, Pará, Amazonas, Rondônia, Maranhão, Mato Grosso and Goiás) and Puerto Rico. It is found at elevations ranging from near sea level to 1600 m.



Figure 4.348 (above) A richly coloured variety of *Christensonella uncata* (Grower: White Oak Orchids).



Figure 4.349 (above) A more pale flowered variety of *Christensonella uncata* (Grower: Napa Valley Orchids).

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One of the most widespread neotropical orchid species, *Christensonella uncata* grows as an epiphyte, rarely as a lithophyte, in a wide variety of habitats that include montane rain forest, swamp forest, dry pine-land and seasonally dry forest. This species is extremely polymorphic as currently circumscribed, and several taxonomists have suggested that it may encompass more than one species.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, or possibly hard tree fern. This species may be potted in a fine bark mix or New Zealand *Sphagnum* moss. Due to the eventual size of this species and its pendent nature, it is better suited to mounting as this allows for continuing growth with minimal disturbance. *Temperature* warm to intermediate. *Light* bright diffuse to bright shade. *Watering* moist but allow to dry slightly between waterings. This species experiences dry periods in parts of its range. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: Although quite common in collections, *Christensonella uncata* has a lot to offer. It is easy to obtain, easy to grow and quickly develops to specimen size if left undisturbed. The upright, needle-like leaves and the clumping habit are quite attractive, and the forms with more open flowers are the most desirable.

This taxon is quite capable of adapting to a variety of growing conditions, making it an excellent choice for a novice. It can bloom at any time in cultivation.



Figure 4.350 (above) *Christensonella uncata* photographed *in situ* near Santa Cruz Barillas, Department of Huehuetenango, Guatemala, at an elevation of 635 metres (Photo: Gary Yong Gee).

Chytroglossa Rchb.f.

Publication: Reichenbach, H. G., 1863, *Hamburger Garten-Blumenzeitung* 19: 546

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Oncidiinae (formerly Ornithocephalinae)

Type species: *Chytroglossa marileoniae* Rchb.f., 1863, *Hamburger Garten-Blumenzeitung* 19: 546.

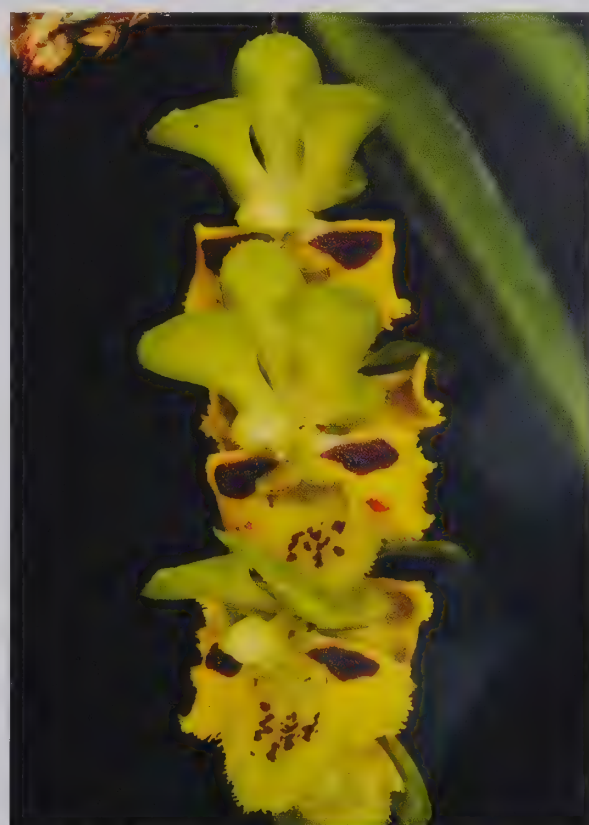
Etymology: From the Greek *chytro* (jug, pot) and *glossa* (tongue), a reference to the subsaccate base of the lip.

Profile: A genus of 3 miniature, sympodial, epiphytic orchid species. The genus is endemic to the rainforests of the Mata Atlântica of southeastern Brazil, occurring at elevations of 500–1800 m.

General plant morphology: Fan-shaped, clumping, branching. *Pseudobulb* minute, subtended by leafy bracts, leaves distichous. *Inflorescence* a raceme, axillary. *Flower* sepals and petals subsimilar, subequal, lip three-lobed, sessile, subsaccate at base, callus surrounded by trichomes, column erect, twisted, bent backwards, without wings or foot; pollinia 4, in two unequal pairs, stipe spatulate, viscidium minute.



Figure 4.351 (above) A mounted *Chytroglossa aurata* plant in bloom puts on a spectacular display with its striking, simultaneous flowers (Grower: Ron Parsons).

CHYTROGLOSSA***Chytroglossa aurata* Rchb.f.****Publication:** *Hamburger Garten-Blumenzeitung* 19: 546 (1863)**Etymology:** From the Latin *auratus* (golden yellow), with reference to the colour of the lip.**Heterotypic synonym:** *Chytroglossa aurata* f. *luteoviridis* V.P.Castro & Chiron.**Morphology:** *Plant* to 6.5 cm tall, clumping, branching, erect. *Pseudobulb* minute, obscured by imbricate bases of 3–4 opposite, persistent leafy bracts, leaf apical, unifoliate. Leaf and leafy bracts: to 6.5 cm long by 0.6 cm wide, petiolate, linear-lanceolate to narrowly elliptic-oblong, apex acute, apiculate, lamina arcuate, leathery, somewhat flexible. *Inflorescence* a raceme, to 10 cm long, descending to pendent, lax, slender, fractiflex, flowers distichously arranged, lateral from base of pseudobulbs and axillary between leafy bracts. *Flower* 0.9–1.2 cm tall, to 12 in number, rarely more, simultaneous, resupinate, widely spreading, lateral sepals slightly reflexed, thinly textured, nodding, long lasting.**Range, elevation and habitat:** *Chytroglossa aurata* is endemic to southeastern Brazil, where it is found in the states of Espírito Santo, Rio de Janeiro and São Paulo. A scarce to rare species in nature, *C. aurata* grows on the mossy lower branches of medium-sized trees in very humid, marshy areas with thick undergrowth. No specific elevation information is known, but based accounts of the genus, it occurs at elevations of over 500 m.**Culture recommendations:** *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern. It may also be potted in small pots or baskets using moss or fine bark mix. The pendent inflorescences are often longer than the pots, so this species displays better on a mount. *Temperature* cool-intermediate to intermediate; but may take temperatures to 26 °C (80 °F) during the day. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.**Comments:** This extremely choice miniature has intricately patterned, crystalline and proportionately large flowers that can last up to a month. A well grown plant of either *Chytroglossa aurata* or *C. marileoniae* with one or more open inflorescences is not soon forgotten. Although currently uncommon in collections, the popularity of this species is growing, and it is an excellent choice for collections grown under lights. *Chytroglossa aurata* tends to bloom in later winter to mid spring in cultivation.**Figure 4.352 (above)** Attractive inflorescences of *Chytroglossa aurata* (Grower: Cindy Hill).**Figure 4.353 (above)** The comparatively large, attractively patterned flowers of *Chytroglossa aurata* (Grower: Judy Carney).

CHYTROGLOSSA***Chytroglossa marileoniae* Rchb.f.****Publication:** *Hamburger Garten – Blumenzeitung* 19: 546 (1863)

Etymology: Named for Mademoiselle Marie Léone Pinel, who prepared a fine, coloured sketch of the type specimen; as Reichenbach remarked in his description, “in just and due acknowledgement of [her] merits as regarded the plant”.

Morphology: Plant 5–6 cm tall, clumping, branching, roots thin, prolific. *Pseudobulb* very small, ovoid, nearly obscured by 1–2 leafy bracts, leaf apical, unifoliate. *Leaf* to 6 cm long by up to 1 cm wide, shortly petiolate, conduplicate at base, narrowly oblong to ligulate, apex acute, lamina suberect to somewhat spreading, flat to arcuate, leathery, relatively rigid. *Inflorescence* a raceme, to 10 cm long, usually longer than leaves, 1–3 simultaneous inflorescences, descending to pendent, maroon, fractiflex, wiry, lax, flowers arranged distichously, lateral from base of pseudobulbs and axillary between leafy bracts. *Flower* 1–1.5 cm tall, to 16 in number, uncommonly more, simultaneous, resupinate, widely spreading, nodding, thin textured.

Range, elevation and habitat: An uncommon Brazilian endemic, *Chytroglossa marileoniae* is found in the states of São Paulo and Rio de Janeiro at elevations between 500–1100 m. It grows epiphytically at the mid to upper tree level in deep shade, favouring moist montane forest with high humidity, low wind movement and daily mist. It blooms between June and September in nature.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern. It may also be potted in small pots or baskets using moss or fine bark mix. The pendent inflorescences are often longer than the pots, so this species displays best on a mount. *Temperature* cool-intermediate to intermediate; tolerating temperatures to 26 °C (80 °F) during the day. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: While very similar in form to *Chytroglossa aurata*, the patterning of the flowers of *C. marileoniae* is more intricate and, to many, more interesting. However, the rarity of this species does make it more difficult to obtain. This fantastic species has numerous, long lasting flowers on a pendent spike that appear in early to mid spring in cultivation. Highly recommended.

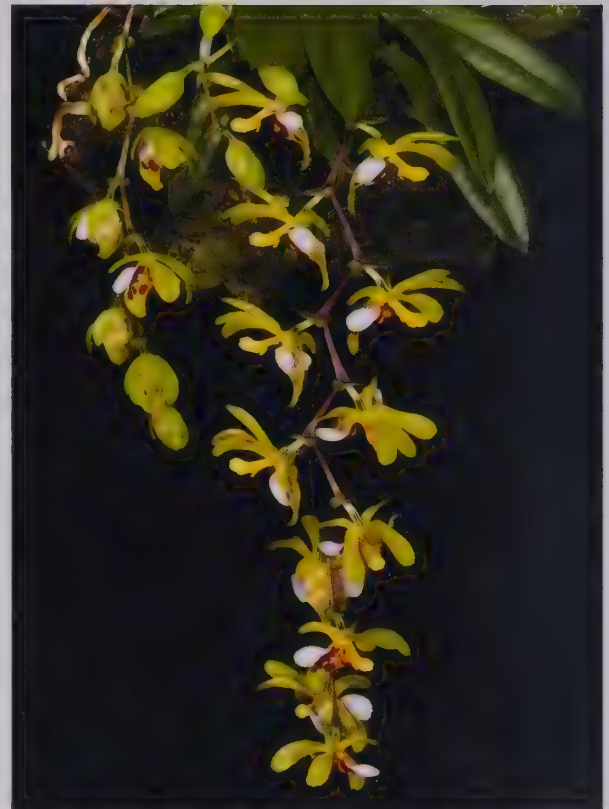


Figure 4.354 (above) The enchanting inflorescence of *Chytroglossa marileoniae* (Grower: Ron Parsons).

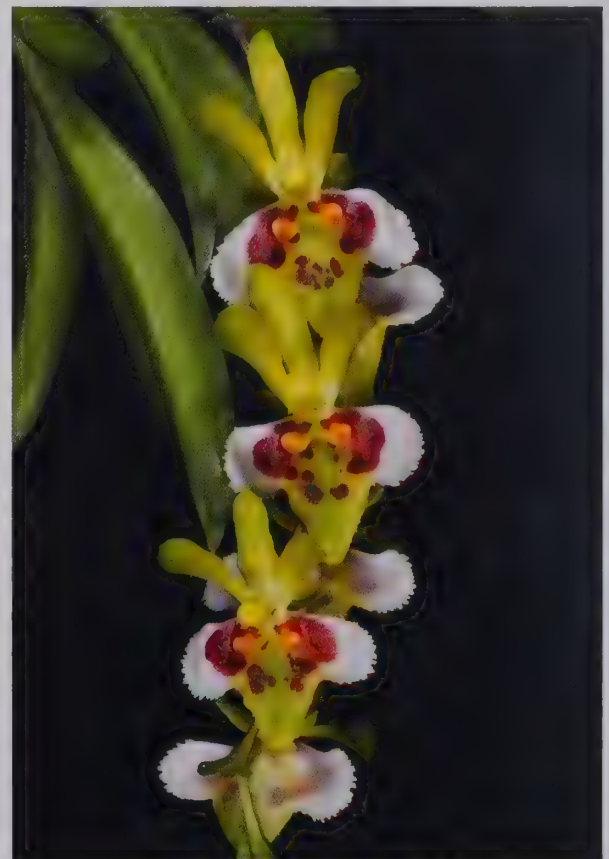


Figure 4.355 (above) *Chytroglossa marileoniae* has beautiful and long lasting flowers (Grower: Ron Parsons).

Comparettia Poepp. & Endl.

Publication: *Poeppig, E. F., & Endlicher, S. F. L., 1836, Nov. Gen. Sp. Pl. 1: 42*

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Oncidiinae

Type species: *Comparettia falcata* Poepp. & Endl., 1836, *Nov. Gen. Sp. Pl. 1: 42*.

Etymology: Named in honour of Andreo Comparetti, plant physiologist and professor of medical botany at the University of Padua, Italy.

Heterotypic synonyms: *Diadenium* Poepp. & Endl., *Chaenanthus* Lindl., *Scelochilus* Klotzsch, *Neokoehleria* Schltr., *Scelochiloides* Dodson & M.W.Chase, *Stigmatorthos* M.W.Chase & D.E.Benn., *Pfitzeria* Senghas, *Scelochilopsis* Dodson & M.W.Chase.

Profile: A genus of over 60 epiphytic species found throughout the neotropics, from Mexico to Bolivia, Brazil, and the West Indies.

General plant morphology: Sympodial, epiphytic, occasionally branching from base, sometimes forming small clumps, often twig epiphytes. *Pseudobulb* elongate to orbicular, often laterally compressed, faintly ribbed, single internode, subtended and often partially obscured by papery bracts, leaves 1–4 in number. *Leaf* often conduplicate, leathery. *Inflorescence* a raceme or, less frequently, a panicle, one or two in number, usually longer than leaves, few to many flowered, lateral from base of pseudobulb. *Flower* showy to relatively insignificant, some species brilliantly coloured, resupinate, dorsal sepal and petals free, widely-spreading to tubular, some barely open at apex, lateral sepals fused at base to form a spur, lip hastate, often with a pair of large apical lobes, often with red and white markings, with simple callus, column straight, without foot or wings, pollinia 2 on common viscidium and stipe. While recent genetic studies have placed well-known genera such as *Scelochilus*, *Neokoehleria*, *Diadenium* and *Scelochilopsis* within *Comparettia* (World Checklist of Selected Plant Families, Kew), this classification has not come to be widely accepted.



Figure 4.356 (above) This unidentified species of *Comparettia* was once included in the genus *Scelochilus* (Grower: Russ Varnado).

COMPARETTIA

Comparettia micrantha (Poepp. & Endl.) M.W.Chase & N.H.Williams

Publication: *Lindleyana* 21(3): 29 (2008)

Etymology: From the Greek *micra* (small) and *anthus* (flowers), referring to the small size of the flowers.

Homotypic synonyms: *Diadenium micranthum* Poepp. & Endl., *Chaenanthus micrantha* (Poepp. & Endl.) Kuntze.

Morphology: Plant 4–12 cm tall, clumping, occasionally branching, slowly creeping, suberect. *Pseudobulb* 0.4–0.6 cm tall by 0.4 cm wide, ovoid, compressed, subtended by 2–4 opposite leafy bracts subequal to the leaf, leaf apical, unifoliate. *Leaf* 3–10 cm long by 1.3–3 cm wide, subpetiolate, oblong-lanceolate to elliptic-oblong, apex acute, lamina erect to suberect, leathery, somewhat flexible. *Inflorescence* loosely flowered panicle, to 45 cm long, peduncle longer than leaves, erect to suberect, floral bracts minute, lateral from base of pseudobulb. *Flower* 0.5–0.7 cm tall, many in number, successive, but with many open at once, usually resupinate but variously orientated, tubular, lateral sepals united for most of their length. Flowers vary in background colour from white to pink with purple markings.

Range, elevation and habitat: *Comparettia micrantha* grows on the eastern slopes of the Andes, occurring in Ecuador (provinces of Morona-Santiago, Napo and Sucumbíos, 220–900 m), Peru (departments of Loreto and Madre de Dios, 140–360 m) and Bolivia. This species grows as an epiphyte on twigs and branches in tropical, lower montane wet forest. It blooms between September and May in nature. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, possibly tree fern. Twig epiphytes in general are not well suited to potted culture. *Temperature* warm to intermediate. *Light* bright shade to medium shade. *Watering* basically moist but allow plants to approach dryness between waterings; well-drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: *Comparettia micrantha*, more widely known as *Diadenium micranthum*, has numerous, tiny flowers on a surprisingly large panicle. Close examination is required to see the intricate beauty of the colourful and interestingly shaped flowers. A twig epiphyte in nature, this species may be somewhat short-lived in cultivation and is not commonly seen in collections. It tends to bloom in the early autumn.



Figure 4.357 (above) The tiny, pretty flowers of *Comparettia micrantha* in detail (Grower: Marni Turkel).



Figure 4.358 (above) A pair of *Comparettia micrantha* flowers (Grower: Marni Turkel).

COMPARETTIA***Comparettia portillae*** (Königer) M.W.Chase & N.H.Williams**Publication:** *Lindleyana* 21(3): 30 (2008)**Etymology:** Named for José (Pepe) Portillae, president of Ecuagenera Nursery in Cuenca, Ecuador. It is the largest orchid nursery in that country, propagating and disseminating a vast number of species annually.**Homotypic synonym:** *Scelochilus portillae* Königer.**Morphology:** *Plant* to 6 cm tall, clumping, occasionally branching, slowly creeping, suberect. *Pseudobulb* 1 cm tall by 0.3 cm wide, subcylindrical, slightly laterally compressed, bracts opposite and dried, leaf apical, unifoliate. *Leaf* to 5 cm long by 1.5 cm wide, lanceolate, apex acute, lamina erect, leathery, somewhat flexible. *Inflorescence* raceme to panicle, to 6 cm long, descending to pendent, lateral. *Flower* 2.5 cm long, to 5 in number, simultaneous, resupinate, not spreading widely, nodding. Flowers vary in size, degree of openness, and intensity of colour.**Range, elevation and habitat:** *Comparettia portillae* occurs in southeastern Ecuador, in the province of Morona-Santiago, at 1600–1800 m altitude. It grows as an epiphyte in moist, mid-elevation montane forest.**Culture recommendations:** *Substrate* mount on cork bark or rough-barked hardwood, or possibly tree fern. Twig epiphytes in general are not well suited to potted culture. *Temperature* intermediate. *Light* bright shade to medium shade. *Watering* basically moist, but allow plants to approach dryness between waterings; well-drained, not wet. As the bulbs mature, reduce water slightly. *Humidity* high. *Air movement* good. *Propagation* by division or seed.**Comments:** Only recently described (2008), this species is uncommon to rare in cultivation and rarely offered for sale. Propagation of plants is therefore an important means of ensuring its wide dissemination in culture. The showy, brilliant orange flowers capture the attention of all that see them, and it is well worth cultivating this species. More attractive in profile than from the front, the brilliantly coloured, tubular flowers are likely hummingbird-pollinated in nature. *Comparettia portillae* is a twig epiphyte and may be short-lived in cultivation. It tends to bloom from early to late winter in cultivation.**Figure 4.359 (above)** The brightly coloured flowers of *Comparettia portillae* (Grower: Walter Teague).

Conchidium Griff.

Publication: Griffith, W., 1851, *Not. Pl. Asiat.* 3: 321

Subfamily: Epidendroideae

Tribe: Podochileae

Subtribe: Eriinae

Type species: *Conchidium pusillum* Griff., 1851, *Not. Pl. Asiat.* 3: 321.

Etymology: From the Greek *konch* (shell) and the diminutive *idion*, referring to the appearance of the pseudobulbs.

Profile: Approximately 10 epiphytic or lithophytic species from northern India, Nepal, Bhutan, Myanmar, Thailand, southern China, Korea, Taiwan and Japan, including the Ryukyu Islands. This genus was recently separated from *Eria*.

General plant morphology: Sympodial, creeping, clumping, often mat-forming. *Pseudobulb* globular, discoid or oblong, laterally compressed to strongly depressed, sometimes reticulate, naked or sheathed, one internode, leaves apical, 1 to 4 in number, subterminal or near apex of pseudobulb. *Leaf* sessile, petiole tapering, obovate-lanceolate, articulate. *Inflorescence* a raceme, filiform, flowers with hooded bracts, from top of pseudobulb. *Flowers* solitary or few, non-resupinate, lateral sepals triangular, lanceolate, acuminate, forming a mentum with column foot, labellum entire or 3-lobed, with claw, column with curving column foot, pollinia 8, rostellum truncate, nearly square in outline.



Figure 4.360 (above) The delightful flower of *Conchidium rhomboidale*, a native of China (Grower: Marni Turkel).

CONCHIDIUM

Conchidium japonicum (Maxim.) S.C.Chen & J.J.Woo.

Publication: *Fl. China*. 25: 348. 2009

Etymology: The epithet *japonicum* refers to Japan, just one of a number of nations in which this species occurs.

Homotypic synonyms: *Eria japonica* Maxim.

Heterotypic synonyms: *Dendrobium reptans* Franch. & Sav., nom. illeg., *Callista reptans* Kuntze, *Eria reptans* (Kuntze) Makino, *Eria arisanensis* Hayata, *Eria matsudae* Hayata, *Eria hosokawae* A.D.Hawkes & A.H.Heller, nom. superfl., *Eria reptans* var. *matsudae* (Hayata) S.S.Ying, *Aeridostachya reptans* (Kuntze) Rauschert.

Morphology: *Plant* individual growths to 10 cm tall, creeping, clustered, mat-forming, much branched, pseudobulbs often arranged in rows. *Pseudobulb* 1–2.6 cm long by 0.3–1 cm wide, narrowly ovoid to ellipsoid, slightly compressed laterally, erect to suberect, covered in papery sheaths, leaves apical, 2–3 in number, annually deciduous. *Leaf* 4–10 cm long by 0.5–1.9 cm wide, narrowly elliptic to linear, apex acute, lamina arcuate to sometimes flat, thinly leathery, flexible. *Inflorescence* loose raceme, to 5 cm long, slender, finely pubescent, flowers with large subtending bracts, subterminal, arising between leaves. *Flower* 1–1.5 cm wide, 1–4 in number, simultaneous, resupinate, spreading widely.



Figure 4.361 (above) The bright flowers of the infrequently seen *Conchidium japonicum* form once known as var. *matsudae* (Grower: MarniTurkel).

CONCHIDIUM

Range, elevation and habitat: *Conchidium japonicum* occurs in southern China (provinces of Anhui, Fujian, Guizhou and Zhejiang, 700–900 m), Korea, Taiwan (1500–2500 m), southern Japan and the Ryukyu Islands (700–900 m), where it grows lithophytically on rocks and cliffs, and epiphytically on mossy trunks and the higher branches of large trees in seasonally moist montane forests. This locally common to abundant species sometimes covers large sections of host trees. In nature, it blooms in the spring.

Culture recommendations: *Substrate* mount on flat pieces of cork bark, rough-barked hardwood, or rough wood shingles to account for its rambling, clustering habit. This species is not well suited to pot culture except possibly in baskets, using moss or fine bark mix if chosen. *Temperature* intermediate to cool. This species can take temperatures to 13 °C (55 °F) at night, 10 °C (50 °F) in winter, and highs to 26 °C (80 °F) in the day. *Light* bright to medium shade. *Watering* moist during growing season, well drained, not wet, reducing water as bulbs mature or in the autumn. Mist roots occasionally in winter during dormancy after leaves have fallen. *Humidity* high in growing season, average during winter. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, but omit fertiliser during dormancy.

Comments: Often seen in cultivation as *Eria japonica*, *Eria reptans* or *Eria reptans* var. *matsudae*, this interesting species has a lovely, crystalline white flower with a bright yellow lip, forming a nice contrast against the green of the seasonal leaves. Attractive even when deciduous, the unusually shaped, somewhat laterally flattened pseudobulbs are aligned in rows. This species can make a nice specimen plant, although it is not commonly seen in cultivation. It blooms in the late spring.



Figure 4.362 (above) Despite its name, the attractive *Conchidium japonicum* is found not only in Japan, but also Korea, China and Taiwan (Grower: Marni Turkel).



Figure 4.363 (above) This clone of *Conchidium japonicum* is perhaps most representative of the nominate race (Grower: Howard Gunn).

CONCHIDIUM

Conchidium rhomboidale (Tang & F.T. Wang) S. C. Chen & J. J. Wood

Publication: *Fl. China*. 25: 347. 2009

Etymology: From the Greek *rhomboides* (rhombus shaped), referring to the shape of the pseudobulbs in cross section.

Homotypic synonym: *Eria rhomboidalis* Tang & F.T. Wang.

Morphology: *Plant* Individual growths 3.5 cm tall, creeping, much branching, mat-forming, pseudobulbs spaced 1–8 cm apart along rhizome, roots pubescent, rooting profusely at base of pseudobulb. *Pseudobulb* to 2.5 cm tall by 1 cm wide, shortly and broadly fusiform to ovoid-conical, erect, enclosed by papery bracts, leaves apical, bifoliate. *Leaf* 2–5.5 cm long, apex acute, apiculate, lamina suberect to horizontal, arcuate, leathery, somewhat flexible. *Inflorescence* a raceme, to 2.5 cm long, terminal. *Flower* 2–2.5 cm wide, 1–2 in number, simultaneous, resupinate, spreading, campanulate, lip with central clavate hairs. Flowers vary from cream to pinkish with the outside of the flower a darker, reddish colour.

Range, elevation and habitat: *Conchidium rhomboidale* is found in China (provinces of Guizhou, Hainan, southwest Guangxi and southeast Yunnan), at elevations between 700–1600 m. A common species, it grows lithophytically on mossy rocks and epiphytically on mossy tree trunks in moist montane forest. It blooms in nature between April and May.

Culture recommendations: *Substrate* mount on a large, flat piece of cork bark or rough wood shingle. This is due to the rambling nature of the species, with its long rhizome between individual pseudobulbs. It is not well suited to potted culture, but larger bulb pots, bonsai pots or baskets containing moss or fine bark mix may work. *Temperature* intermediate to intermediate-cool, to 13 °C (55 °F) at night, or 10 °C (50 °F) in winter, with highs of 26 °C (80 °F) in the day. *Light* bright to medium shade. *Watering* moist during growing season, well drained, not wet, drier in winter. *Humidity* high in growing season, average during winter. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly during the growth season, but reduce to every two weeks during winter.

Comments: The lovely, open flowers have a delightful yellow to pinkish colour offset by the frilly mid-lobe and red and white striped side-lobes of the lip. Uncommon in cultivation, it is sometimes mislabelled as *Eria caobayense* in collections. This name appears to be a trade name, as there is no record of publication. *Conchidium rhomboidale* has somewhat short-lived flowers, lasting about a week, and blooms in the winter in cultivation.

Note added in proof: Novel DNA studies have placed this species in *Eria*, rather than *Conchidium*. A recent publication (Shuiteman, Pedersen & Ng, 2013) saw this species transferred back to *Eria* as *Eria rhomboidalis*.



Figure 4.364 (above) Creamy yellow *Conchidium rhomboidale* flowers (Grower: Marni Turkel).

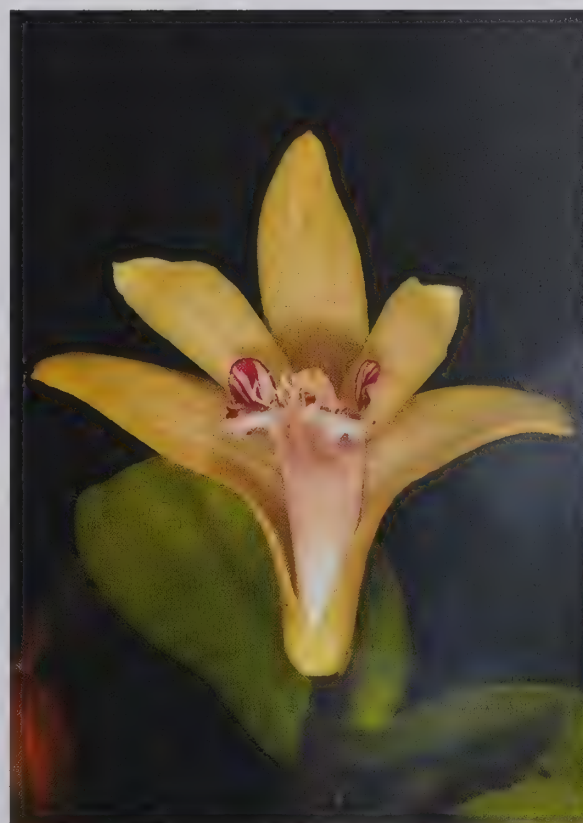


Figure 4.365 (above) A *Conchidium rhomboidale* variety with flowers slightly tinged with pink (Grower: Judy Carney).

Constantia Barb.Rodr.

Publication: Barbosa Rodrigues, J., 1877, *Gen. Spec. Orchid.* 1: 78

Subfamily: Epidendroideae

Tribe: Epidendreae

Subtribe: Laeliinae

Type species: *Constantia rupestris* Barb.Rodr., 1877, *Gen. Spec. Orchid.* 1: 79.

Etymology: Named in honour of Constância Barbosa Rodrigues by her husband João Barbosa Rodrigues, the Brazilian botanist and explorer who described the species.

Profile: A genus of 6 epiphytic or rupicolous species from southeast and southern Brazil. Many of the species grow on *Vellozia*, a genus of woody monocots in the Velloziaceae.

General plant morphology: Sympodial, small to tiny, creeping, branching, roots not branching, rhizome inconspicuous. *Pseudobulb* spherical, usually depressed to compressed, lying flat, green or brown, leaves terminal, bifoliate. *Leaf* widely elliptic to ovate, usually spreading, fleshy. *Inflorescence* a raceme, up to two times the length of leaves, rarely longer. *Flower* small, to 3 cm in diameter, one to two in number, resupinate, sepals and petals the same colour, generally white, cream or pinkish, lip more or less entire, flat and pointing downwards, fused to the base of column to form a sac-like nectary, 8 pollinia.



Figure 4.366 (above left) The attractive plant and delicate pink bloom of *Constantia christinae* (Grower: Marni Turkel).

Figure 4.367 (above right) The solitary flower of *Constantia microscopica*. These are two of the smallest *Constantia* species (Grower: Marni Turkel).

CONSTANTIA

Constantia cipoensis Porto & Brade

Publication: *Arq. Inst. Biol. Veg.* 2: 208 (1935)

Etymology: From the Serra do Cipó, in the Serra do Espinhaço, Minas Gerais, Brazil, where this species is endemic.

Morphology: *Plant* to 1 cm tall, creeping, branching, clumping, prostrate, pseudobulbs tightly clustered, with proportionately large roots. *Pseudobulb* to 1 cm tall by up to 0.5 cm wide, round, somewhat flattened, adpressed to substrate, obliquely erect, enclosed in deciduous papery bracts, grey-green, leaves apical, bifoliate, deciduous. *Leaf* 0.5–0.7 cm long by 0.6–0.8 cm wide, one leaf usually larger than the other, sessile, ovate to nearly orbicular, apex obtuse to rounded, minutely but unequally bilobed, lamina spreading, prominent venation, thick, rigid, leathery, grey-green. *Inflorescence* a raceme, much abbreviated, erect to suberect, slender, terminal. *Flower* 2–2.5 (rarely to 3) cm wide, proportionately large, single, usually nodding, spreading, campanulate, fragrant. Flowers vary noticeably in terms of shape and size.

Range, elevation and habitat: *Constantia cipoensis* is endemic to the Serra do Cipó in the state of Minas Gerais, Brazil. A rare species, it grows epiphytically on *Vellozia compacta* and *V. piresiana* at elevations between 1000–1400 m. The habitat is cool and dry. In nature it blooms between autumn and early winter.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, not tree fern. This species is sometimes imported on pieces of *Vellozia*. Not at all suited to pot culture. *Temperature* cool. *Light* bright diffuse to bright shade. *Watering* water then allow to dry, ensuring that the plant dries out completely between waterings. The dry period should not be prolonged. *Humidity* average. *Air movement* good to brisk. *Propagation* rarely by division, and by seed. *Fertilise* at 1/4 strength weekly during active growth, but less frequently during winter.

Comments: *Constantia cipoensis* is a fantastic miniature. It has wonderful, grey-green foliage, round, flattened pseudobulbs and leaves that are nearly adpressed to the substrate, as well as a proportionately huge, pristine, white flower that is usually larger than the plant itself. Known to be difficult to grow, in order to be successful with this species it is important to adhere closely to the cultural requirements. Moreover, it detests root disturbance, making propagation by division a limited possibility due to its refractory nature. A true treasure for growers of miniature orchids, it has the added feature of a delicate scent for a short time at dusk. *Constantia cipoensis* blooms in cultivation in early to mid-autumn.



Figure 4.368 (above) *Constantia cipoensis*, a Brazilian endemic, bears large, elegant white flowers (Grower: Cindy Hill).



Figure 4.369 (above) The wonderful pseudobulbs and leaves of *Constantia cipoensis* (Grower: Andy's Orchids).

CONSTANTIA

Constantia rupestris Barb.Rodr.

Publication: *Gen. Spec. Orchid.* 1: 79 (1877)

Etymology: From the Latin *rupestris* (of rock), referring to the rupicolous habit of this species.

Homotypic synonym: *Sophronitis rupestris* (Barb.Rodr.) Cogn.

Morphology: *Plant* 1–1.5 cm tall, creeping, branching, clumping, erect. *Pseudobulb* 1–1.5 cm tall by 0.8–1 cm wide, orbicular to pyriform, flattened, enclosed in papery bracts, bifoliate. *Leaf* 0.7–0.8 cm long by 1 cm wide, one leaf usually larger than other, nearly orbicular, apex bilobed, lamina spreading, slightly papillose, rigid, thick, leathery. *Inflorescence* a raceme, to 1 cm long including pedicillate ovary, erect, slender, terminal. *Flower* 0.8–1 cm tall, single, spreading, erect, fragrant.

Range, elevation and habitat: *Constantia rupestris* is a rare Brazilian endemic of the low coastal mountains of Rio de Janeiro and Espírito Santo states. It grows lithophytically on rocks, often in full sun, but with near constant mists, and blooms in March.

Culture recommendations: *Substrate* mount on a suitable piece of cork bark or rough-barked hardwood to allow for growth, probably not on tree fern. This species is not at all suited to pot culture. *Temperature* intermediate to cool. *Light* bright diffuse. *Watering* ensure that the plant dries out completely between waterings. The dry period should not be prolonged. *Humidity* average. *Air movement* good to brisk. *Propagation* rarely by division, and by seed. *Fertilise* at 1/4 strength weekly during active growth, but less frequently during winter.

Comments: Vegetatively, *Constantia rupestris* is quite similar to *C. cipoensis*, but the smaller, nonetheless proportionately large, flowers of *C. rupestris* are more colourful and quite different in shape. The subtle fragrance is an added feature of these attractive flowers. This species detests root disturbance, and thus propagation by division is difficult. It blooms in the autumn in cultivation.

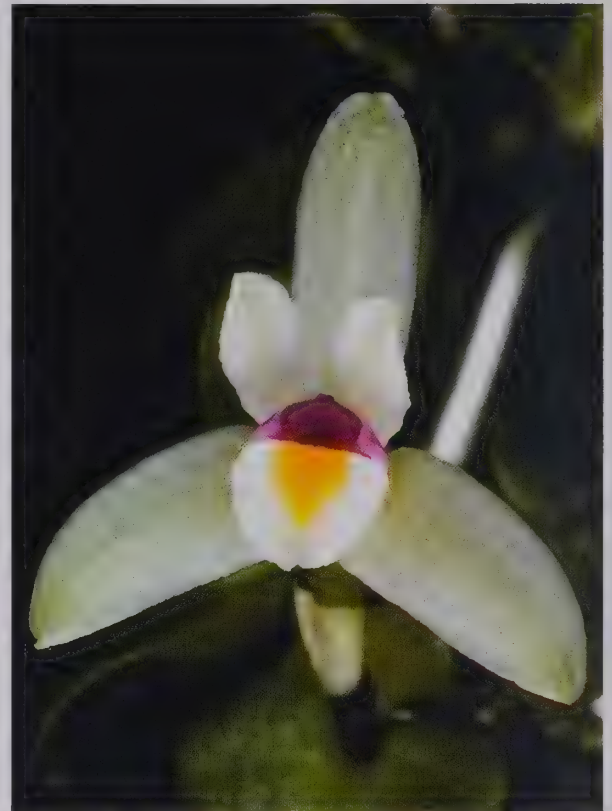


Figure 4.370 (above) *Constantia rupestris* is a rare, relatively large flowered taxon (Grower: Marni Turkel).



Figure 4.371 (above) Two fine *Constantia rupestris* flowers in cultivation (Grower: Larry Moskovitz).

Cyrtorchilum Kunth

Publication: Kunth, C.S., 1816, *Nov. Gen. Sp.* 1: 349

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Ondiciinae

Etymology: From the Greek *kyrtos* (curved) and *cheilos* (lip), referring to the strongly bent lip in the type species.

Type species: *Cyrtorchilum undulatum* Kunth, 1816, *Nov. Gen. Sp.* 1: 349.

Heterotypic synonyms: *Neodryas* Rchb.f., *Rusbyella* Rolfe, *Buesiella* C.Schweinf., *Dasyglossum* Königer & Schildh., *Trigonochilum* Königer & Schildh., *Irenea* Szlach., Mytnik, Górniak & Romowicz, *Siederella* Szlach., Mytnik, Górniak & Romowicz.

Profile: Over 130 epiphytic or lithophytic species, basically Andean in distribution, with only a few outlying species in southern Central America and some of the Caribbean islands. They occur mostly at middle to higher elevations of 1500–3000 m.

General plant morphology: Sympodial, pseudobulbs congested to spreading widely along rhizome. *Pseudobulbs* ovoid, usually oval in cross-section, two to six leafy bracts, leaves 2–4, apical. *Inflorescence* a panicle, occasionally racemic, long, erect to arching or vining, sometimes scrambling through nearby vegetation, flowers loosely spaced to congested near apex, lateral from base of pseudobulb. *Flowers* many, often showy, sepals and petals somewhat fleshy, often clawed, spreading, petals usually smaller, lip fleshy, smaller than sepals and petals, three-lobed or entire, with a ridged to many toothed callus, column often winged, pollinia 2.



Figure 4.372 (above) The brilliant orange flowers of an unidentified *Cyrtorchilum* (formerly *Neodryas*) species (Grower: Steve Beckendorf).

CYRTOCHILUM

Cyrtochilum meirax (Rchb.f.) Dalström

Publication: *Lindleyana* 16: 70 (2001)

Etymology: From the Greek *meirax* (girl, enchanting) referring to the flowers.

Homotypic synonyms: *Oncidium meirax* Rchb.f., *Trigonochilum meirax* (Rchb.f.) Königer & Schildh.

Heterotypic synonyms: *Oncidium alatum* Cogn., *Trigonochilum alatum* (Cogn.) Königer & Schildh., *Cyrtochilum dodianum* (Ackerman & Chiron) Ackerman, *Oncidium dodianum* Ackerman & Chiron, *Trigonochilum dodianum* (Ackerman & Chiron) Senghas.

Morphology: *Plant* 1–12.5 cm tall, pseudobulbs clustered to 1 cm apart along rhizome. *Pseudobulb* to 2.5 cm tall by 1.5 cm wide, broadly elliptic-ovoid to obovoid, laterally compressed, 2–5 leaf like bracts, leaf apical, 1, sometimes 2 in number. *Leaf* to 10 cm long by up to 1.5 cm wide, subpetiolate, base attenuate and conduplicate, oblong-lanceolate to linear-lanceolate, apex acute to obtuse, lamina erect to suberect, flexible to thinly leathery. *Inflorescence* a raceme or panicle, to 40 cm long, erect to suberect, triquetrous or flattened-ancipitous, fractiflex, flowers distichous, lateral. *Flower* 2–2.8 cm tall, few to 12 or more in number, simultaneous, resupinate, widely spreading.

Range, elevation and habitat: *Cyrtochilum meirax* is a locally common species that grows in Colombia (departments of Antioquia, Nariño and Risaralda, 1350–2050 m), Venezuela (states of Tachira and Yaracuy, 600–1700 m), Ecuador (provinces of Carchi, Cotopaxi, El Oro, Esmeraldas, Imbabura, Morona-Santiago, Napo, Pastaza, Pinchincha, Tungurahua and Zamora-Chinchipe, 800–2000 m), and Peru as well as in the Greater Antilles (950–1300 m). It is found growing as an epiphyte in lower to mid-elevation wet forests, sometimes even on cultivated fruit trees.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, or possibly tree fern. This species may also be potted using a fine bark mix or possibly New Zealand *Sphagnum* moss in pots or baskets. *Temperature* warm to intermediate. *Light* bright shade. *Watering* moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed.

Comments: *Cyrtochilum meirax* has a number of singular qualities that distinguish it within the genus. It is the smallest species, the most widespread, the only one to grow in a warmer tropical habitat in a group of higher elevation species, and it has a unique, triangular to flattened, sharp-edged inflorescence. The striking, proportionately large flowers have a large, thick, waxy lip and attractive yellow and brown patterning. In cultivation, it has flowered in every season of the year.



Figure 4.373 (above) The wonderful flowers of *Cyrtochilum meirax* 'San Carlos' CBR/AOS (Grower: Lilian Severin).



Figure 4.374 (above) The flowers of *Cyrtochilum meirax* may vary in colour intensity (Grower: Marni Turkel).



Dendrobium Sw.

Publication: Swartz, O. P., 1799, *Nova Acta Regiae Soc. Sci. Upsal.* 6: 82

Subfamily: Epidendroideae

Tribe: Dendrobieae

Subtribe: Dendrobiinae

Type species: *Dendrobium moniliforme* (L.) Sw., 1799, *Nova Acta Regiae Soc. Sci. Upsal.* 6: 85.

Etymology: From the Greek *dendro* (tree) and *bios* (life), referring to the epiphytic habit of many of the species.

Heterotypic synonyms: *Abaxianthus* M.A.Clem. & D.L.Jones; *Aclinia* Griff.; *Amblyanthe* Rauschert; *Amblyanthus* (Schltr.) Brieger; *Anisopetala* (Kraenzl.) M.A.Clem.; *Aporum* Blume; *Australorchis* Brieger; *Bolbidium* Brieger; *Bouletia* M.A.Clem. & D.L.Jones; *Cadetia* Gaudich.; *Callista* Lour; *Cannaeorchis* M.A.Clem. & D.L.Jones; *Cepobaculum* M.A.Clem. & D.L.Jones; *Ceratobium* (Lindl.) M.A.Clem. & D.L.Jones; *Ceraia* Lour; *Chromatotriccum* M.A.Clem. & D.L.Jones; *Coelandria* Fitzg.; *Conostalix* (Kraenzl.) Brieger; *Davejonesia* M.A.Clem.; *Dendrobates* M.A.Clem. & D.L.Jones; *Dendrocoryne* (Lindl.) Brieger (nom. inval.); *Desmotrichum* Blume (nom. illeg); *Dichopus* Blume; *Diplocaulobium* (Rchb.f.) Kraenzl.; *Distichorchis* M.A.Clem. & D.L.Jones; *Ditulima* Raf.; *Dockrilobium* J.M.H.Shaw; *Dolichocentrum* (Schltr.) Brieger; *Durabaculum* M.A.Clem. & D.L.Jones; *Eleutheroglossum* (Schltr.) M.A.Clem. & D.L.Jones; *Endeisa* Raf.; *Epigeneium* Gagnep.; *Ephemerantha* P.F.Hunt & Summerh.; *Eriopexis* (Schltr.) Brieger; *Euphlebiium* (Kraenzl.) Brieger; *Eurycaulis* M.A.Clem. & D.L.Jones; *Exochanthus* M.A.Clem. & D.L.Jones; *Flickingeria* A.D.Hawkes; *Froscula* Raf.; *Goldschmidtia* Dammer; *Grastidium* Blume; *Herpetophytum* (Schltr.) Brieger; *Ichthyostomum* D.L.Jones, M.A.Clem. & Molloy; *Inobulbon* Schltr. & Kraenzl.; *Katherinea* A.D.Hawkes; *Keranthus* Lour. ex Endl.; *Kinetochilus* (Schltr.) Brieger; *Latourea* Blume.; *Latourorchis* Brieger; *Leioanthum* M.A.Clem. & D.L.Jones; *Macccraithea* M.A.Clem. & D.L.Jones; *Macrostomium* Blume; *Microphytanthe* (Schltr.) Brieger; *Monanthos* (Schltr.) Brieger; *Onychium* Blume, Bijdr.; *Ormostema* Raf.; *Orthoglottis* Breda; *Oxyglossellum* M.A.Clem. & D.L.Jones; *Pedilonum* Blume, Bijdr.; *Sarcocadetia* (Schltr.) M.A.Clem. & D.L.Jones; *Sarcopodium* Lindl.; *Sayeria* Kraenzl.; *Schismoceras* C.Presl; *Stachyobium* Rchb.f.; *Stelbophyllum* D.L.Jones & M.A.Clem. orth. var.; *Stilbophyllum* D.L.Jones & M.A.Clem.; *Tetrabaculum* M.A.Clem. & D.L.Jones; *Tetradon* (Kraenzl.) M.A.Clem. & D.L.Jones; *Thelychiton* Endl.; *Thicuania* Raf.; *Trachyrhizum* (Schltr.) Brieger; *Tropilis* Raf.; *Winika* M.A.Clem., D.L.Jones & Molloy; *Vappaculum* M.A.Clem. & D.L.Jones; *Vappodes* M.A.Clem. & D.L.Jones.

Profile: A genus of over 1250 species, ranging from India, in the west, throughout tropical and subtropical Asia, Australasia, and as far east as the islands of the south Pacific. Species occur from sea level to 3800 m altitude, in habitats ranging from near desert through to rainforest and high montane alpine conditions.

General plant morphology: Sympodial, epiphytic, lithophytic or rarely terrestrial, erect to pendent. *Pseudobulb* minute to gigantic, nearly globose to cane-like or even absent, extremely variable in shape; leaves one to many, usually distichous. *Leaf* highly variable, but usually leathery, thin-textured to succulent. *Inflorescence* a raceme, usually at apex of stem or from nodes along stem. *Flower* minute to large, single-flowered to many, ephemeral to extremely long lived, dorsal sepal free, the lateral sepals fused, with prominent column foot forming a spur-like mentum, petals free, spreading, lip unlobed or three-lobed, column short and stout, pollinia 4, in 2 pairs.

DENDROBIUM***Dendrobium bellatulum* Rolfe****Publication:** *J. Linn. Soc., Bot.* 36: 10 (1903)**Etymology:** From the Latin *bellatulus* (lovely, enchanting), with reference to the flowers.**Heterotypic synonyms:** *Dendrobium bellatulum* var. *cleistogamia* Pradhan.

Morphology: *Plant* 5–10 (occasionally to 12) cm tall, closely set, erect to suberect, leaves distichous. *Pseudobulb* to 10 cm tall by up to 1.8 cm thick, fusiform or short clavate, grey-green, covered with fine black hairs, 2–4 subterminal leaves. *Leaf* 1.5–4 cm long by 1–1.3 cm wide, ligulate to narrowly elliptic to oblong-lanceolate, apex obtuse, unequally bilobed, lamina grey-green, covered with fine black hairs on both surfaces, at least while young, eventually deciduous. *Inflorescence* a raceme, much abbreviated, suberect, arising subterminally from near apex of generally deciduous canes. *Flower* 3–3.5 cm wide, 1–3 in number, simultaneous, resupinate, spreading widely, mildly fragrant. Flower varies in width of segments and in lip colour, from pale yellow to red-orange to nearly red, often bicoloured.

Range, elevation and habitat: A widespread and locally common species, *Dendrobium bellatulum* is found in Northeast India, Myanmar, Thailand, Laos, Vietnam and China (southern Yunnan Province) at 900–2100 m altitude. It grows epiphytically in bright light on tree trunks and large branches in various habitats, including deciduous forest, open forest, and cliff edge in strongly seasonal climates. It blooms from December to April in Thailand, and October to November in India, but may bloom occasionally at other times of the year, particularly in other parts of its range. Conservation status unknown.



Figure 4.376 (above) The stunning, highly contrasted blooms of *Dendrobium bellatulum* are highly captivating (Grower: Cindy Hill).

DENDROBIUM

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, rough wood shingles, and possibly tree fern. This species can also be potted in New Zealand *Sphagnum* moss or a fine bark mix, although it is better suited to mounting. *Temperature* intermediate to intermediate-cool. *Light* bright diffused to bright shade. *Watering* moist, but drying slightly between waterings. Reduce water in the autumn or as pseudobulbs mature, but keep much drier in winter when plant is dormant, misting the roots occasionally. *Humidity* high during the growing season, but average during winter. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: *Dendrobium bellatulum* is a stunning species with a colourful yellow, orange, red, or even bicoloured lip offset against the open white flowers. The handsome, greyish-green foliage, as well as the pseudobulbs, are covered in fine blackish hairs, a typical characteristic of the section Formosae. Considered somewhat difficult by many, *D. bellatulum* may be sensitive to overwatering during the cooler, drier season, or underwatering during the growing season. A close relative, *Dendrobium christyanum* Rchb.f., differs in the patterning of the lip, being white with a basal red and yellow colour. Although the very desirable *D. christyanum* has miniature forms, it also attains much larger sizes, both in plant and flower, in parts of its range. *Dendrobium bellatulum* tends to bloom between autumn and spring in cultivation.



Figure 4.377 (above) A mounted *Dendrobium bellatulum* specimen in full bloom (Grower: Dave Hermeyer).



Figure 4.378 (above) There is some variation in *Dendrobium bellatulum* flower colour; this form is paler and has more yellow to the lip (Grower: Cindy Hill).
Figure 4.379 (facing page) Detail of a *Dendrobium bellatulum* bicolour bloom (Grower: Marni Turkel).





Figure 4.380 (above) The flower of *Dendrobium christyanum*, also a close relative of *D. bellatulum* and *D. lueckelianum* (Grower: Brad Cotten).

Figure 4.381 (below) Another cultivar of *Dendrobium christyanum*. Though similar, these taxa can all be readily distinguished (Grower: Golden Gate Orchids).



Figure 4.382 (above) Closely related to *Dendrobium bellatulum* is *D. lueckelianum*, which differs in lip colouration and callus details (Grower: Cindy Hill).
Figure 4.383 (below) A multi-growth *Dendrobium lueckelianum* plant with numerous blooms (Grower: Cindy Hill).

DENDROBIUM

Dendrobium bulbophylloides Schltr.

Publication: *Repert. Spec. Nov. Regni Veg. Beih.* 1: 457 (1912)

Etymology: The Latin suffix *-oides* (looks like) indicates that this species has the superficial appearance of a *Bulbophyllum*.

Homotypic synonyms: *Microphytanthe bulbophylloides* (Schltr.) Brieger.

Heterotypic synonyms: *Dendrobium mayrii* J.J.Sm., *Cadetia mayrii* (J.J.Sm.) P.F.Hunt.

Morphology: *Plant* 1.5–3 cm tall (individual growths), much branching, densely mat-forming, creeping to pendent, pseudobulbs spaced 0.5–2.5 cm apart along a slender rhizome. *Pseudobulb* 0.4–1 cm tall by 0.2–0.6 cm wide, ovoid, green to purplish-brown, unifoliate. *Leaf* 0.6–2 cm long by 0.3–1.1 cm wide, shortly petiolate, ovate to oblong, apex rounded to acute, lamina suberect to spreading, fleshy, thick, punctate, green to purplish ventrally. *Inflorescence* a raceme, peduncle 0.5 cm long, suberect, borne from apex of pseudobulb. *Flower* 0.8–1.4 cm wide, single, resupinate, widely spreading, proportionately large. Flowers vary in colour from orangey-yellow to rusty orange, also in degree of spotting.

Range, elevation and habitat: *Dendrobium bulbophylloides* is found in northern and eastern New Guinea at elevations between 1000–2700 m. It grows as an epiphyte in cool, moist, mossy montane forest, forming dense mats on tree limbs, often in tall trees. It is quite likely that plants can bloom at any time in nature. Conservation status unknown.

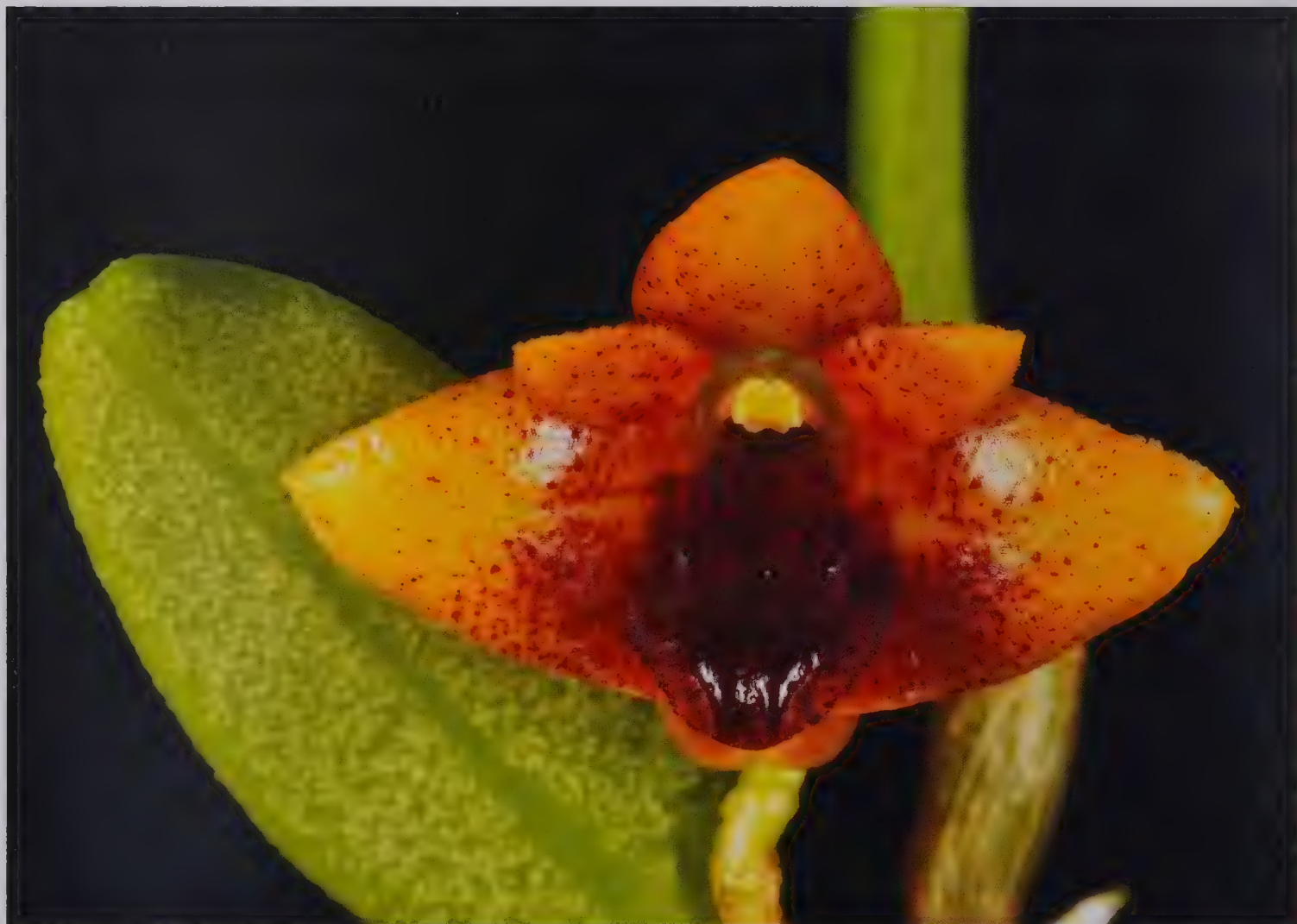


Figure 4.384 (above) The cute, but proportionately large flower of *Dendrobium bulbophylloides* 'Fox Den' (Grower: Marni Turkel).

DENDROBIUM

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, or possibly tree fern. The authors have not seen this species potted, but potting may be suitable if plants are grown in shallow bulb pots or in baskets using New Zealand *Sphagnum* moss or a fine bark mix. The forms with longer spacing between pseudobulbs are better mounted. *Temperature* intermediate to cool. *Light* bright shade. *Watering* moist, well-drained, not wet. *Humidity* high. *Air movement* good. *Propagation* easy by division, or seed.

Comments: A very cute species with proportionately large flowers, *Dendrobium bulbophylloides* is still somewhat uncommon in cultivation. The authors have noted that the forms with a long rhizome grow relatively quickly, forming good-sized specimens; for those with limited space, these may be kept manageable by making divisions. Other forms are quite slow growing. The rhizome commonly branches, allowing for easy propagation, and plants bloom frequently and at any time when thriving, making this member of section *Microphytanthe* a desirable species to cultivate.



Figure 4.385 (right) A blooming specimen of *Dendrobium bulbophylloides* 'Gerald McCraith' (Grower: White Oak Orchids).



Figure 4.386 (above) Flowers of the *Dendrobium bulbophylloides* clone 'Gerald McCraith' (Grower: Hanging Gardens).

DENDROBIUM**DENDROBIUM***Dendrobium cuthbertsonii* F.Muell.**Publication:** *Trans. & Proc. Roy. Soc. Victoria* 24: 175 (1888)

Etymology: Named for the original collector, Walter R. Cuthbertson, who led the Royal Geographical Society's exploration party to the highlands of British New Guinea. He was accompanied by the naturalist W. A. Sayer. The party visited Thursday Island, Port Moresby and the coast from Kappa Kappa to Mt. Obree.

Homotypic synonyms: *Pedilonum cuthbertsonii* (F.Muell.) Brieger., *Maccraitha cuthbertsonii* (F.Muell.) M.A.Clem. & D.L.Jones.

Heterotypic synonyms: *Dendrobium agathodaemonis* J.J.Sm., *Dendrobium asperifolium* J.J.Sm., *Dendrobium sophronites* Schltr., *Dendrobium trachyphyllum* Schltr., *Dendrobium coccinellum* Ridl., *Dendrobium euphues* Ridl., *Dendrobium fulgidum* Ridl., *Dendrobium laetum* Schltr., *Dendrobium atromarginatum* J.J.Sm., *Dendrobium carstensiense* J.J.Sm., nom. illeg., *Dendrobium lichenicola* J.J.Sm., *Pedilonum asperifolium* (J.J.Sm.) Brieger, *Pedilonum trachyphyllum* (Schltr.) Brieger, *Pedilonum coccinellum* (Ridl.) Rauschert, *Pedilonum euphues* (Ridl.) Rauschert, *Pedilonum sophronites* (Schltr.) Rauschert, *Maccraitha agathodaemonis* (J.J.Sm.) M.A.Clem. & D.L.Jones, *Maccraitha asperifolia* (J.J.Sm.) M.A.Clem. & D.L.Jones, *Maccraitha atromarginata* (J.J.Sm.) M.A.Clem. & D.L.Jones, *Maccraitha coccinella* (Ridl.) M.A.Clem. & D.L.Jones, *Maccraitha euphues* (Ridl.) M.A.Clem. & D.L.Jones, *Maccraitha lichenicola* (J.J.Sm.) M.A.Clem. & D.L.Jones, *Maccraitha sophronites* (Schltr.) M.A.Clem. & D.L.Jones, *Maccraitha trachyphylla* (Schltr.) M.A.Clem. & D.L.Jones.

Morphology: Plant 2–8 cm tall, frequently branching, mounding, clump forming to 12 cm wide in nature, 20 cm or more in cultivation, erect to suberect. *Pseudobulb* 0.5–8 cm tall by 0.1–0.7 cm wide, spheroid to ovoid, clavate or occasionally stem-like, varying with degree of exposure, leaves 1–5, more or less towards the upper half of the pseudobulb. *Leaf* 0.5 to 4.2 cm long by 0.2–1.5 cm wide, ovoid to broadly elliptic to linear, apex obtuse to rounded, occasionally acute, lamina thinly leathery and rigid to soft, fleshy and thin textured, verrucose-papillose to nearly smooth (glabrous), generally dark to blackish green, with prominent, sunken midvein, usually purplish underneath. *Inflorescence* a raceme, peduncle extremely abbreviated, lax, terminal or rarely lateral. *Flower* 2.2–4.5 cm long by 2–3.5 cm wide, single, non-resupinate, ascending-horizontal to nodding, spreading to widely spreading, mentum very long, trumpet shaped in profile, lip usually, but not always, with dark coloured, red to dark brownish-red margin. Typical forms are orange, reddish-orange, red or pink, but purple, rose, yellowish-orange, yellow, pale yellow, almost white and bicour forms of various combinations also occur. Flowers sometimes open one colour and change to another as they age.



Figure 4.387 (above) An orange bicour bloom of *Dendrobium cuthbertsonii* (Grower: Ron Parsons).



Figure 4.388 (above) The pretty blooms of *Dendrobium cuthbertsonii* 'Mountain Sunshine' (Grower: Ron Parsons).

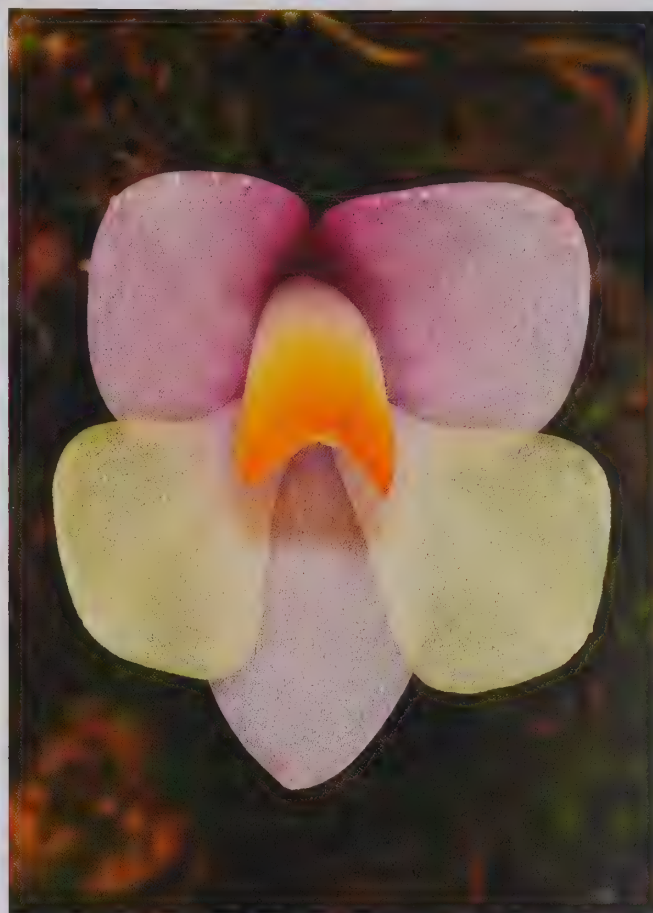


Figure 4.389 (above left) The richly coloured flower of *Dendrobium cuthbertsonii* 'Anna' (Grower: Ron Parsons).

Figure 4.390 (above right) A pink, white and orange *Dendrobium cuthbertsonii* bloom (Grower: Hanging Gardens).

Figure 4.391 (below) The striking blooms of a red agathodaemonis-type *Dendrobium cuthbertsonii* (Grower: Ron Parsons).

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Range, elevation and habitat: *Dendrobium cuthbertsonii* is found throughout New Guinea and the Bismark Archipelago (New Britain & New Ireland) where it grows at elevations of 750–3450 m, but usually at 2000 m or higher. It is typically epiphytic on stunted, mossy trees including *Nothofagus* (Southern Beech) and shrubs, as well as on tree ferns at forest margins and in ridge forests. This species occasionally grows lithophytically on mossy, stream-side rocks or cliff faces, as well as terrestrially along road cuttings. Plants experience frequent rains and near constant breezes in all situations. *Dendrobium cuthbertsonii* is not considered threatened and is locally common to abundant. It blooms in any month of the year.

Culture recommendations: *Substrate* potted in high quality New Zealand *Sphagnum* moss or in a fine, open bark mix with small pieces of tree fern and perlite (sponge rock). This species may also be mounted on cork bark or tree fern, again using only high quality moss. *Temperature* intermediate to cool. Plants easily tolerate temperatures as low as 10 °C (50 °F) at night, and sometimes even a few degrees cooler, year-round. Days are best kept below 24 °C (75 °F). *Light* bright diffuse, if kept cool and humid, to bright shade. *Watering* keep moist, well drained, not wet. Use highest quality water possible with low total dissolved solids. *Humidity* high. *Air movement* good to brisk. *Propagation* division or seed. If dividing, do not make small divisions; the more pseudobulbs, the more likely the plants will thrive. This species resents root disturbance and



Figure 4.392 (above) Pale pink and white *Dendrobium cuthbertsonii* bicolour blooms (Grower: Judy Carney).



Figure 4.393 (above) Pink *agathodaemonis*-type *Dendrobium cuthbertsonii* blooms (Grower: Cindy Hill).

DENDROBIUM

division, so care must be taken, particularly if working on plants grown on mounts. If potted in moss, repot yearly. Fertilise at 1/8 to 1/4 strength weekly; this species is exceptionally sensitive to overfeeding.

Comments: The authors believe that this true collector's item has amongst the most variable flower colour ranges in the orchid family. The images give some idea of the variety that *Dendrobium cuthbertsonii* exhibits. A feature that photos cannot portray is the extremely long-lived nature of the flowers, from six to as many as nine months. A well-bloomed plant never fails to attract attention. Initial success with this species can be highly addictive, so much so that the desire to collect every colour form possible can quickly result in significant expenditures. Never inexpensive to purchase, many people have lost their investments in trying to grow these gems; if one does not have cool-growing conditions year-round, as well as access to high-quality water, it is perhaps best to admire this species from afar. When using a municipal water supply, it is important to monitor the water quality on a weekly basis as the quality may change radically without warning.

The attractive plants have dark green, usually bumpy or warty leaves and grow in tight tufts. Even the seed capsules are unusual, with hairy, somewhat raised ribs. Well-grown plants are nearly always in bloom year-round.



Figure 4.394 (above) Dark pink *Dendrobium cuthbertsonii* blooms sporting white tips (Grower: Hanging Gardens).



Figure 4.395 (above) Handsome orange and red flowers cover a *Dendrobium cuthbertsonii* 'Lafayette' plant (Grower: Steve Beckendorf).

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As suggested by the significant list of synonyms, this species is also variable in plant habit. A form, recognised for many years as a separate, closely related species (*Dendrobium agathodaemonis*), was distinguished by the lack of a dark margin on the labellum of the flowers, as well as by its nearly smooth leaves. In recent years, intergradation has been identified, thereby blurring these distinctions, and this taxon is now considered to fit easily within the natural range of variation of *D. cuthbertsonii*. *Dendrobium cuthbertsonii* belongs to section *Oxyglossum*, but on occasion has been placed within section *Cuthbertsonia*.



Figure 4.396 (above) *Dendrobium cuthbertsonii* plants growing epiphytically on a tree fern in New Guinea (Photo: Gary Yong Gee).



Figure 4.397 (above) A pink *Dendrobium cuthbertsonii* form grows *in situ* with a *Bulbophyllum* species, New Guinea (Photo: André Schuiteman).
Figure 4.398 (below) Assorted *Dendrobium cuthbertsonii* varieties growing in a private collection (Grower: Hanging Gardens).





Figure 4.399 (facing page) A mounted specimen of *Dendrobium cuthbertsonii* with pink and white bicoloured lips (Grower: Cordelia Wong).
Figure 4.400 (above) A potted pink and white *Dendrobium cuthbertsonii* bicoloured variety (Grower: Golden Gate Orchids).
Figure 4.401 (below) Massed, multicoloured flowers of *Dendrobium cuthbertsonii* 'Tari Gap' (Grower: John Leathers).



Figure 4.402 (above) An orange variety of *Dendrobium cuthbertsonii* (Grower: Hanging Gardens).

Figure 4.403 (below) This clone of *Dendrobium cuthbertsonii* opens pink and changes to white (Grower: Hanging Gardens).



Figure 4.404 (above left) A peach-pink *Dendrobium cuthbertsonii* bloom (Grower: Phyl Nicholas).

Figure 4.405 (above right) Pink *Dendrobium cuthbertsonii* flowers with light yellow petal tips (Grower: Ron Parsons).

Figure 4.406 (below) *Dendrobium cuthbertsonii* 'Christopher John', Award of Merit, American Orchid Society (Grower: Steve Beckendorf).



Figure 4.407 (above left) A purple and orange variety of *Dendrobium cuthbertsonii* (Grower: Ron Parsons).

Figure 4.408 (above right) A purple and white bicoloured *Dendrobium cuthbertsonii* (Grower: Ron Parsons).

Figure 4.409 (below) A pink flowered *agathodaemonis*-like *Dendrobium cuthbertsonii* plant in bloom (Grower: Hanging Gardens).



Figure 4.410 (above) Pale pink and white bicoloured *Dendrobium cuthbertsonii* 'Vistamont' blooms (Grower: Steve Beckendorf).

Figure 4.411 (below) The flowers of *Dendrobium cuthbertsonii* 'Mango' have pink petals and sepals with an orange lip (Grower: Steve Beckendorf).

DENDROBIUM

Dendrobium cyanocentrum Schltr.

Publication: *Fl. Schutzgeb. Südsee, Nachtr.*: 160 (1905)

Etymology: From the Greek *cyano* (dark or cornflower blue) and *centros* (spur), referring to the dark blue mentum.

Homotypic synonyms: *Pedilonum cyanocentrum* (Schltr.) Rauschert, *Oxyglossellum cyanocentrum* (Schltr.) M.A.Clem. & D.L.Jones.

Heterotypic synonyms: *Dendrobium lapeyrouseoides* Schltr., *Dendrobium flavispiculum* J.J.Sm., *Pedilonum flavispiculum* (J.J.Sm.) Rauschert, *Pedilonum lapeyrouseoides* (Schltr.) Rauschert.

Morphology: *Plant* 1.5–8 cm tall, branching, clumping, erect to semi-pendent, rhizome short, to 0.3 cm between growths, slightly ascending, leaves distichous, 2–3 (sometimes 4) in number, towards apex of pseudobulb. *Pseudobulbs* 0.3–2.5 cm tall, ovoid, obclavate to fusiform. *Leaf* 1 to 3 cm long, occasionally longer, by 0.15–0.4 cm wide, linear-ligulate, apex acute, acuminate tip, lamina conduplicate, semi-glossy. *Inflorescence* a raceme, peduncle abbreviated, terminal, blooms on growths with or without leaves. *Flower* 1.1–1.8 cm wide, 1–2 in number, simultaneous, resupinate, widely spreading, upright or downward facing, lightly fragrant. Flower varies in colour and intensity from pale to bright blue-violet, pink to bi-coloured to whitish, and in the width of the stripes.

Range, elevation and habitat: *Dendrobium cyanocentrum* occurs in New Guinea at elevations of 40–1600 m. It grows as an epiphyte in rain forest, in forest clearings, on trees along water courses, and as a twig epiphyte in low, secondary forest. It is likely that this species can bloom in any month in nature. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark or tree fern, and probably rough-barked hardwood, using a pad of high quality New Zealand *Sphagnum* moss around the roots. This species may also be potted using moss or a fine bark mix. If potted in moss, repot yearly. *Temperature* warm to intermediate, depending on the provenance of the plant. *Light* bright shade. *Watering* keep moist, well-drained, not wet. Use the highest quality water possible. *Humidity* high. *Air movement* good. *Propagation* by division, best with a good number of pseudobulbs, or seed. *Fertilise* at 1/4 strength weekly; this species is sensitive to overfeeding.

Comments: Another orchid gem, *Dendrobium cyanocentrum*, whilst diminutive, has flowers that are visually striking, with often intense colours and bold stripes. Moreover, the flowers have an intriguing shape, frequently likened to that of a sharp-billed bird in flight with swept-back wings. The authors feel that the showiest forms are those with broad, bright violet striping. Plants are occasionally available, but they are usually somewhat expensive and so it is recommended that they be purchased in



Figure 4.412 (above) The striking blooms of *Dendrobium cyanocentrum* (Grower: Cindy Hill).

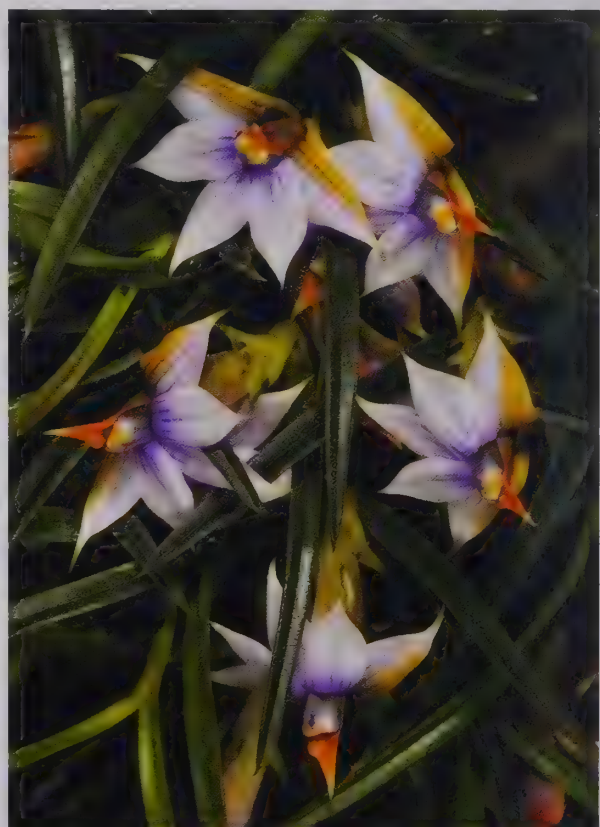


Figure 4.413 (above) Flowers and leaves of *Dendrobium cyanocentrum* 'Cosmos Bicolor' (Grower: Terry Thompson).

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bloom where a particular colour form is desired. As per *D. cuthbertsonii*, this species should be avoided if high quality water cannot be provided, though unlike that species, *D. cyanocentrum* favours intermediate conditions.

Dendrobium cyanocentrum plants and flowers are quite similar to *D. subuliferum*, but differ in flower colour and shape. The former has narrower, strongly reflexed, pointed sepals and petals of the aforementioned colours, whereas the latter has full-shaped segments that are pure white and not swept back. When not in flower, the plants are difficult to distinguish. *Dendrobium cyanocentrum* can bloom at almost any time in cultivation, but usually does so between early winter and early summer. It is included in section *Oxyglossum*.



Figure 4.414 (right) A predominantly white *Dendrobium cyanocentrum* bloom (Grower: J & L Orchids).



Figure 4.415 (above) A mass flowering *Dendrobium cyanocentrum* grows epiphytically on a mossy tree trunk *in situ*, New Guinea (Photo: André Schuiteman).

DENDROBIUM

Dendrobium dekokkii J.J.Sm.

Publication: *Bull. Jard. Bot. Buitenzorg*, II, 2: 14 (1911)

Etymology: Named for the original collector, A.C. de Kock, a medical health officer attached to the south New Guinea detachment (September 1910 to February 1912), who gave the first account of an encounter with the 'Goliath pygmies' of the Eastern Highlands of Irian Jaya.

Homotypic synonym: *Pedilonum dekokkii* (J.J.Sm.) Rauschert.

Heterotypic synonyms: *Dendrobium chrysornis* Ridl., *Dendrobium montigena* Ridl., *Dendrobium erythrocarpum* J.J.Sm., *Dendrobium cedricola* P.Royen, *Dendrobium gaudens* P.Royen, *Dendrobium kerewense* P.Royen, *Pedilonum chrysornis* (Ridl.) Rauschert, *Pedilonum montigena* (Ridl.) Rauschert.

Morphology: *Plant* 2–8 (occasionally to 15) cm tall, pseudobulbs usually close set, occasionally a short rhizome between growths, branching, rhizomes slowly ascending to form small, tufted mounds, erect to semi-pendent, leaves 2–4 in number. *Pseudobulb* 0.2–5 cm tall by 0.1–0.6 cm wide, polymorphic in form, from fusiform to ovoid, globose, clavate or cylindrical. *Leaf* 0.5–6 cm long by 0.1–0.4 cm wide, basically sessile, lanceolate to narrowly linear or oblong-elliptic, apex sub-acute, apiculate, lamina erect to spreading, leathery, rigid, dimpled to rugose, green to purple. *Inflorescence* a raceme, peduncle much abbreviated, to 2 simultaneous inflorescences, usually erect, terminal. *Flower* 1.4–3.5 cm long, 1–2, sometimes 3, in number, simultaneous, resupinate, flat, upright, lip appressed to column, thick textured, long lasting. The flowers vary mostly in shape, but neither greatly nor consistently, and are bright orange to reddish-orange. This species is quite variable in plant habit.

Range, elevation and habitat: *Dendrobium dekokkii* occurs in New Guinea at elevations of 2300–3800 m, but is more often found at the higher end of this elevational range. It grows as an epiphyte on stunted *Dacrycarpus* (Podocarpaceae) that are often laden with black mosses, on other trees, as well as *Cyathea* tree ferns in grasslands, and on alpine shrubs along forest margins near or at the tree line. Plants can be locally abundant and are often found growing with *D. brevicaule* Rolfe.

Culture recommendations: *Substrate* mount on cork bark or tree fern, possibly rough-barked hardwood using high quality New Zealand *Sphagnum* moss around the roots. This species may also be potted using moss or possibly a fine bark mix incorporating tree fern pieces. It grows better when mounted. *Temperature* cool to cold. This species prefers daytime temperatures to 16 °C (60 °F) and nights of 5–7 °C (40–45 °F). *Light* bright diffuse, if kept cold and humid, to bright shade. *Watering* keep moist, well drained, not wet. Use the highest quality water possible, with low total dissolved solids. *Humidity* high. *Air movement* good to brisk, ensuring



Figure 4.416 (above) *Dendrobium dekokkii* plants in flower (Grower: Ron Parsons).



Figure 4.417 (above) A pair of *Dendrobium dekokkii* flowers (Grower: Ron Parsons).

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humidity is high so as to avoid drying out plants. *Humidity* high. *Propagation* by division or seed. If obtained, plants should ideally be propagated by seed to increase the amount and variety of material in cultivation. *Fertilise* at 1/4 strength weekly. This species can be very difficult to keep alive, so the conditions of culture should be followed closely. The authors have kept a number of plants alive for several years by growing them outside in a relatively cool, often foggy area near San Francisco, California. If potted in moss, repot yearly.

Comments: *Dendrobium decockii* is quite rare in cultivation, most probably due to high mortality during importation, in addition to its demanding growth requirements. While many growers can provide a cool growing area, this plant thrives in conditions that are just a little colder. This feature, along with its need for water of the highest quality, puts this species outside the capabilities of many growers. It is hence rarely imported into the United States. Regardless, it is a beautiful species with brilliant orange blossoms that last months, and photos of it nature often show plants virtually hidden by a mass of flowers.

Dendrobium decockii is often found growing alongside a very similar species, *D. brevicaule*, in nature. Plants of the latter taxon are larger and have less erect flowers with purplish-black anther caps. If obtained, *D. brevicaule* would demand the same, difficult growing conditions. Both species are included in section *Oxyglossum* and can flower in any month in cultivation.



Figure 4.418 (above) *Dendrobium decockii* in habitat, Simbo province, New Guinea, at an elevation of 3500 m. *Mediocarpus* sp. and *Bulbophyllum* sp. were also observed growing on the less mossy parts of the same tree (Photo: Nathalie Juhonewe Simonsson).

DENDROBIUM

Dendrobium delacourii Guillaumin

Publication: *Bull. Mus. Natl. Hist. Nat.* 30: 522 (1924)

Etymology: Named in honour of the American ornithologist, Jean Théodore Delacour (1890–1985), an expert on the distribution and taxonomy of birds in southeast Asia.

Morphology: *Plant* to 8 cm tall, clustered, branching, erect. *Pseudobulbs* to 6 cm tall, or 10 cm in cultivation, by up to 2.5 cm wide, 2–5 distal leaves, annually deciduous in early winter. *Leaf* to 10 cm long by 3 cm wide, elliptic-oblong to ovate, apex acute to obtuse, sometimes apiculate, lamina erect to spreading, thinly leathery, flexible, slightly fleshy. *Inflorescence* a raceme, 1–5 (occasionally more) simultaneous inflorescences, to 3 cm long, with tiny subtending bracts, lateral, subterminal from newest growths. *Flower* to 3 cm wide, to 12 in number (often more in cultivation), simultaneous, resupinate, widely spreading, lip at 45° angle to other segments, intricately fringed. Flowers vary from dark yellow to light greenish-white.

Range, elevation and habitat: *Dendrobium delacourii* grows in Myanmar, Thailand, Laos, Cambodia, Vietnam and possibly India at elevations of 250–1300 m. It is found in hot, seasonally deciduous forests with a distinct dry season. Plants are often exposed to full sun. In nature it blooms between April and August, and it is leafless for much of the year. It is widespread and locally common.

Culture recommendations: *Substrate* pot in small pots or baskets in New Zealand *Sphagnum* moss or a fine bark mix. It may also be mounted on cork bark, rough-barked hardwood, rough wood shingles and probably tree fern. *Temperature* warm to hot during growth, cooler at night during winter, 12 °C (to 55 °F). *Light* bright diffuse to bright shade. *Watering* keep moist, well drained, not wet, during growing season, gradually watering less frequently as pseudobulbs mature and winter approaches. In late winter, give plants a dry rest for 1–2 months, only watering occasionally and lightly. *Humidity* high. *Air movement* good. *Propagation* by division or seed. Plants resent root disturbance, so potting should be done only in early spring when new roots start to grow. *Fertilise* at 1/4 to 1/2 strength weekly during active growth, but reduce or omit fertiliser during dormancy.

Comments: *Dendrobium delacourii* is a choice, relatively common member of section *Stachyobium*. The long-lived flowers have an unusual, club-like fringe along the upward facing lip. This species exemplifies the difference in size between plants in nature and in cultivation. In the wild, both plants and inflorescences are shorter, but both can reach up to 12.5 cm in cultivation. *Dendrobium delacourii* is closely related and similar to *D. venustum* Teijsm. & Binn., but the latter is a much larger growing species. Though the flowers are similar, the mid-lobe of *D. venustum* has noticeably longer cilia. In cultivation, plants bloom between early spring and early autumn.



Figure 4.419 (above) The open inflorescence of *Dendrobium delacourii* in full flower (Grower: Golden Gate Orchids).



Figure 4.420 (above) *Dendrobium delacourii* blooms in detail (Grower: Napa Valley Orchids).

DENDROBIUM

Dendrobium garrettii Seidenf.

Publication: *Opera Bot.* 83: 127 (1985)

Etymology: Named for H. B. G. Garrett, originally from Britain, a forest officer for the Royal Thai Government who lived in and collected in Thailand for over 60 years. He contributed significantly to the knowledge of the orchids of that country.

Morphology: *Plant* to 6 cm, densely clumping, much branching, erect. *Pseudobulb* 0.7–1.6 cm tall by up to 1 cm wide, nearly conical to ovoid, slightly laterally compressed, older pseudobulbs may have swollen nodes, leaves 2–3 at apex of pseudobulb with 2 leaf-like subtending bracts, annually deciduous. *Leaf* to 5 cm long by up to 1.7 cm wide, ovate-lanceolate to ligulate, apex acute, lamina arcuate, suberect, thin textured. *Inflorescence* a raceme, 2–5 cm long, erect to suberect, slender, flowers congested at apex, terminal to subterminal. *Flower* 1–1.5 cm wide (rarely larger), to 9 in number, basically simultaneous, resupinate, spreading, campanulate, faintly fragrant.

Range, elevation and habitat: *Dendrobium garrettii* is endemic to Kanchanaburi Province, northwest Thailand, where it grows as an epiphyte on trees on the southern slopes of Mt. Pakao, near the 1800 m summit. The area where it grows is warm, with good rainfall in the summer, but has a distinct dry season with cool winter nights. Plants bloom mid-summer in nature. Conservation status unknown, but as a narrow endemic its status is of concern.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, or rough wood shingles using a thin pad of New Zealand *Sphagnum* moss. This species may be potted in small pots or baskets using a fine bark mix. It is probably best not to use moss in pots for plants that require a drier period as the moss is hard to re-wet. *Temperature* intermediate, but much cooler in winter, to 5 °C (40 °F) at night. *Light* bright shade, but brighter in winter. *Watering* moist, well drained, not wet during growing season. Reduce water as pseudobulbs mature in the autumn, but mist roots occasionally during winter on bright days, ensuring that plants completely dry out for a few days between. *Humidity* high during growth, average during winter dormancy. *Air movement* good. *Propagation* by division or seed. The plants resent root disturbance so mount them on sufficiently sized pieces of wood, or repot only when new growth starts in the spring. It is best to withhold fertiliser during the winter dormancy.

Comments: An uncommonly seen member of section *Stachyobium*, *Dendrobium garrettii* has particular charm. It can have several, subtly multicoloured flowers open at one time, all clustered towards the end of the thin spike. The flowers are quite long lasting, and the inflorescence may bear flowers for up to three months. Although this species blooms in mid-summer in nature, it blooms in early autumn to mid-winter in collections.



Figure 4.421 (above) The long lasting blooms of *Dendrobium garrettii*, a native of Thailand (Grower: Mary Gerritsen).



Figure 4.422 (above) A predominantly white *Dendrobium garrettii* variety (Grower: White Oak Orchids).

DENDROBIUM***Dendrobium gregulus* Seidenf.****Publication:** *Opera Bot.* 83: 133 (1985)**Etymology:** From the Latin *gregulus* (crowded), referring to the closely spaced pseudobulbs.**Morphology:** *Plant* to 7 cm tall, clustered, mat-forming, numerous fine roots. *Pseudobulbs* to 1.2 cm tall by 1 cm wide, globose, slightly elongated, 1–2 leaf-like subtending bracts, leaves apical, 2 in number, annually and quickly deciduous. *Leaf* to 4.5 cm long by up to 0.6 cm wide, linear lanceolate to ligulate, apex obtuse to acute, lamina soft, flexible. *Inflorescence* a raceme, to 7 cm long, erect to suberect, filiform, flowers with subtending bracts, congested towards apex, subterminal to terminal, from deciduous pseudobulbs. *Flower* 1–1.5 cm wide, to 6 in number, simultaneous, resupinate, spreading, campanulate.**Range, elevation and habitat:** *Dendrobium gregulus* is endemic to northern and western Thailand. It grows epiphytically on branches in open, montane, deciduous forest with a distinct dry season at elevations of 1000–1250 m. Blooming between January and March, it forms cushions of densely packed pseudobulbs that are leafless for much of the year. Conservation status unknown.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using little to no moss. If potted, use small pots or baskets with fine bark mix. It is best not to use moss in pots for plants that require a dry period as moss is difficult to re-wet. *Temperature* warm to intermediate during the growing season, but cooler during the winter to 10 °C (50 °F). *Light* bright shade during growth, bright diffuse during winter rest. *Watering* keep moist and well drained, not wet, during growth, reducing water as pseudobulbs mature in autumn. Occasionally mist or lightly water the roots in winter when plants are dormant and leafless. *Humidity* high during growth, but average (~50 %) during winter. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly during the growing season.**Figure 4.423 (above)** The pretty blooms of *Dendrobium gregulus* cluster close to the top of the inflorescence (Grower: Cordelia Wong).

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Comments: A particularly appealing little species, *Dendrobium gregulus* has an erect inflorescence bearing pale, frilly-lipped flowers atop clustering, quite round, leafless pseudobulbs. It is not commonly seen in collections, and will not do well for those with constant, year-round, warmer conditions. This species belongs to section *Stachyobium* and often blooms during the winter in cultivation.



Figure 4.424 (above) The inflorescences of *Dendrobium gregulus* are borne erect from supporting pseudobulbs, displaying well on a mount (Grower: Cordelia Wong).

DENDROBIUM

Dendrobium hymenanthum Rchb.f.

Publication: *Bonplandia* (Hannover) 3: 222 (1855)

Etymology: From the Greek *hymen* (membrane) and Latin *anthos* (flower), referring to the thin textured flowers.

Homotypic synonyms: *Callista hymenantha* (Rchb.f.) Kuntze, *Bolbidium hymenanthum* (Rchb.f.) Rauschert, *Ceraia hymenantha* (Rchb.f.) Suárez.

Heterotypic synonyms: *Dendrobium quadrangulare* E.C.Parish & Rchb.f., *Callista quadrangularis* (E.C.Parish & Rchb.f.) Kuntze, *Dendrobium pumilum* E.C.Parish & Rchb.f., nom. illeg., *Bolbidium quadrangulare* (E.C.Parish & Rchb.f.) Brieger.

Morphology: Plant to 10 cm tall, clustered, much branched, slowly creeping, forming dense clumps. leaves opposite, one usually larger. *Pseudobulb* 3–10 cm tall, tetragonal, clavate, base very slender, furrowed, sheathed, leaves apical, bifoliate. *Leaf* to 4.3 cm long by up to 1.3 cm wide, ovate to narrowly ovate, apex obtuse, lamina spreading, leathery, fleshy, stiff. *Inflorescence* a raceme, peduncle much abbreviated, individual pseudobulbs bloom repeatedly and periodically, sometimes more than one simultaneous single-flowered inflorescence per pseudobulb, from apex, thought to be initiated by sudden temperature drops. Flower 2–2.5 cm long, single, resupinate, spreading widely, proportionately very large mentum, extremely short lived, rarely more than 24 hours, fragrant. Flowers are white to yellowish white.

Range, elevation and habitat: A common and widespread species, *Dendrobium hymenanthum* occurs in Myanmar (Tenasserim region), western Thailand, Vietnam, Peninsular Malaysia, Borneo and the Philippines (Bataan, Quezon and Rizal provinces of Luzon Island, and the Polillo Islands). It grows as an epiphyte in steamy, hot, lowland forests and sometimes mangrove swamps, often in fairly open situations. It is found at elevations of 0–300 m in areas with a drier winter and spring. Plants may bloom at any time at intervals throughout the year.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. It may also be potted in small pots or baskets using a very open, fast-draining fine bark mix. *Temperature* warm to hot. *Light* bright shade, but bright diffuse in winter. *Watering* keep moist, well-drained, not wet, except in winter when plants should be allowed to dry out between waterings. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly during active growth, but reduce or omit fertiliser during dormancy.

Comments: Although *Dendrobium hymenanthum* is a common and widespread species in nature, it is not commonly seen in cultivation, at least in within the United States. The pleasingly fragrant flowers last just one day, but blooming may occur at any time of the year. It is thought that the plants bloom in response to sudden drops in temperature caused by weather changes. This species is closely related to *D. pachyphyllum* and there is much taxonomic confusion between the two. Although the plants are nearly identical, the flowers differ, those of the latter have more widely spreading segments, often reddish markings on the side-lobes of the lip, and a yellow to greenish-yellow spot in the centre of the mid-lobe. Both of these attractive plants are easy to grow and are very rewarding when in bloom, with large numbers of flowers.



Figure 4.425 (above) *Dendrobium hymenanthum*, a species that occurs widely in southeast Asia (Grower: Brad Cotten).

DENDROBIUM

Dendrobium jenkinsii Wall. ex Lindl.

Publication: *Edwards's Bot. Reg.* 25: t. 37 (1839)

Etymology: Named after Major General Francis Jenkins (1793–1866), Commissioner of Assam, who was in the Bengal army (1809–1861).

Homotypic synonym: *Dendrobium aggregatum* var. *jenkinsii* (Wall. ex Lindl.) King & Pantl.

Heterotypic synonym: *Dendrobium marseillei* Gagnep.

Morphology: *Plant* 3–10 cm tall, clustered, branching, mat-forming, suberect to nearly prostrate. *Pseudobulb* 1–5 cm long by 0.7–1.4 cm wide, fusiform to ovoid-oblong, 4-ribbed, somewhat flattened, leaves terminal, unifoliate. *Leaf* 1–5 cm long by 0.8–2 cm wide, oval to oblong, apex obtuse and notched, lamina thickened, leathery, rigid, long-lived. *Inflorescence* a raceme, peduncle short, entire inflorescence slightly longer than leaf, arching to descending, subterminal, arising from nodes near apex of pseudobulb. *Flower* 2–3 cm wide, 1–3 (to 5 in cultivation) in number, simultaneous, resupinate, widely spreading (nearly flat), lip pubescent, flower fairly short lived, from 7–10 days.

Range, elevation and habitat: A widespread and common species, *Dendrobium jenkinsii* grows in China (southern Yunnan province), Bhutan, Sikkim, Northeast India, Myanmar, Laos, and northern and northeastern Thailand. It grows epiphytically on tree trunks and branches as well as lithophytically on rock faces in open, deciduous, montane forest, at elevations between 250–2000 m. Plants bloom in nature between December and May, but most heavily between March and May. In Thailand, plants bloom in January, and in Bhutan, in May.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using little or no moss around the roots. This species is not well suited to potted culture due to its creeping, ascending habit. *Temperature* intermediate to warm during the growing season, tolerating temperatures of 7–10 °C (45–50 °F) in winter. *Light* bright shade for most of year, but bright diffuse in winter. *Watering* provide plentiful moisture during growth, but keep well-drained. Reduce water during the autumn or when pseudobulbs mature, but keep much drier with occasional light watering or misting during winter rest. *Air movement* good to brisk. *Humidity* high, but average (~60 %) in winter. *Propagation* easily by division or seed. *Fertilise* at 1/4 to 1/2 strength whilst growing, but withhold fertiliser during the cooler rest period.

Comments: *Dendrobium jenkinsii*, a member of section *Callista* (*Densiflorum*), is a common and readily obtainable species that is also easy to cultivate. Attractive even without flowers, plants have somewhat unusually-shaped pseudobulbs that are enclosed in fine, papery sheaths, each topped by a thick, leathery, dark green leaf. The brilliant, orange-



Figure 4.426 (above) A profusion of *Dendrobium jenkinsii* flowers make a wonderful display (Grower: John Roberts).

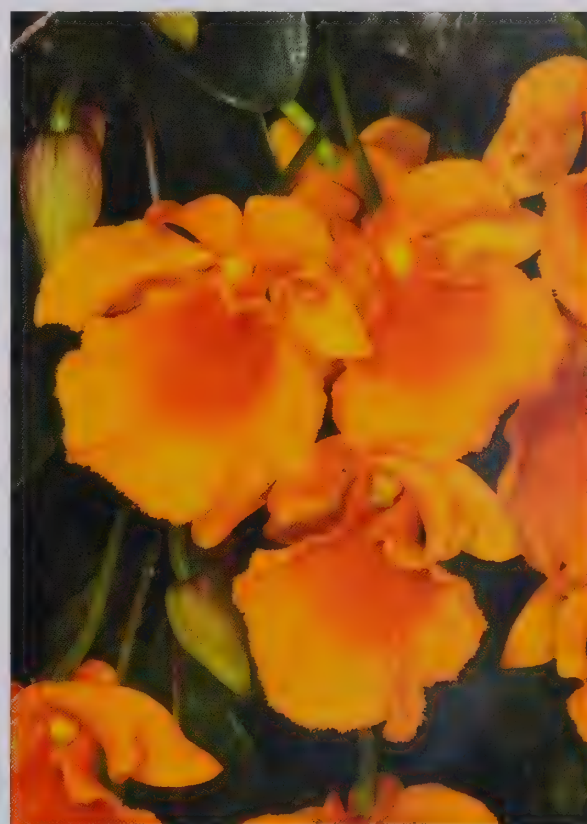


Figure 4.427 (above) *Dendrobium jenkinsii* flower detail (Grower: Cindy Hill).

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yellow flowers virtually glow, and are easily seen from a distance. A specimen in full bloom is not quickly forgotten.

While the flowers are somewhat short-lived, at 7–10 days, this species is a truly magnificent addition to any miniature orchid collection. A close, but obviously larger relative, *Dendrobium lindleyi* Steud. (synonym *D. aggregatum*), has much longer sprays of up to 20 or so paler, yet otherwise similar flowers. Some may find *D. jenkinsii* difficult to bloom, but it is important to remember that this species requires a drier, cooler rest period for optimal flowering. In cultivation plants bloom between mid-late winter and late spring.



Figure 4.428 (right) Pendent *Dendrobium jenkinsii* plants (Grower: Cindy Hill).



Figure 4.429 (above) *Dendrobium jenkinsii* growing as an epiphyte in its natural setting in southeast Asia. Plants are clearly apparent when in bloom, their brightly coloured flowers easily drawing attention. Here, they favour the slightly protected underside of a tree limb (Photo: Andy Wang).

DENDROBIUM

Dendrobium leucocyanum T.M.Reeve

Publication: *Orchadian* 7: 134 (1982)

Etymology: From the Greek *leukos* (white) and Latin *cyaneus* (blue) referring to the colour of the flowers.

Morphology: *Plant* 1–3 cm, creeping, much branching, mat-forming, pseudobulbs closely set to 1 cm between growths, oblique. *Pseudobulb* 0.5–2 cm long by 0.7 cm wide, ovoid, oblong to sub-orbicular to ovoid, somewhat compressed, ribbed, wrinkled, green, but developing olive to brownish hues with age, leaves 2 to rarely 3 in number, one leaf often larger than others, apical, eventually deciduous. *Leaf* to 2 cm long by up to 1.3 cm wide, oval-elliptic to ovate, apex obtuse, apiculate, lamina spreading, leathery, rigid, newer growth purple underneath. *Inflorescence* a raceme, abbreviated, flowers with small subtending bracts, borne laterally at apex of deciduous pseudobulb. *Flower* 0.8–1.1 cm long, to 20 in number, simultaneous, resupinate, not spreading widely, upward facing. Flower colour varies from pale blue, greyish blue, bluish green to green with blue segment tips.

Range, elevation and habitat: *Dendrobium leucocyanum* occurs in northern Papua New Guinea (provinces of Enga and Morobe) at elevations of 2000–2600 m. It grows as an epiphyte in wet montane forest on a variety of host trees amongst mosses and lichens. Plants bloom between January and February in nature.

Culture recommendations: *Substrate* mount on cork bark or tree fern, possibly rough-barked hardwood. This species is not well suited to potted culture due to its ascending plant habit. *Temperature* intermediate-cool to cool, preferring day temperatures averaging 24 °C (75 °F). *Light* bright shade. *Water* keep moist, well drained, not wet. Use highest quality water possible, low in total dissolved solids. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. This uncommon to rare species should be propagated and distributed whenever possible. *Fertilise* at 1/4 strength weekly.

Comments: One of the smallest members of the section *Pedilonum*, *Dendrobium leucocyanum* is sought by a great many collectors. Unfortunately, it remains uncommon in collections and is expensive when available. The blooms can be a strange and unique shade of blue, a very unusual colour for an epiphytic orchid species, and a specimen plant with many clusters of flowers is an alluring sight.

Often turning an unusual reddish brown as they mature, the attractive, ribbed pseudobulbs are topped by broadly oval, spreading leaves. The leaves are deciduous after two to three seasons. Only once they drop do the flowers appear, their colours offset beautifully against that of the pseudobulbs.



Figure 4.430 (above) The unusual, bluish flowers of *Dendrobium leucocyanum* clone 'Ligia' (Grower: Cindy Hill).



Figure 4.431 (above) *Dendrobium leucocyanum* 'Mem. Gerald McCraith', with greenish flowers (Grower: Ron Parsons).

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In cultivation, plants tend to bloom during the winter, as they do in nature. A rare natural hybrid with *D. alaticaulinum* P. van Royen has been documented, and is named *D. × yengiliense* T.M. Reeve.



Figure 4.432 (right) The bluish tinged flowers of *Dendrobium leucocyanum* 'Ligia' present a somewhat otherworldly appearance (Grower: Ron Parsons).



Figure 4.433 (above) Flower detail of the *Dendrobium leucocyanum* clone 'Ligia', seen here in cultivation (Grower: Ron Parsons).

DENDROBIUM

Dendrobium masarangense Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 10: 78 (1911)

Etymology: From Mount Masarang, a mountain in northern Sulawesi.

Morphology: *Plant* 1.5–7 cm tall, pseudobulbs close set, rarely elongating between growths, branched. *Pseudobulb* 0.2–2, occasionally 3, cm tall by 0.1–0.35 cm wide, globose, obclavate, fusiform or cylindrical, leaves near apex, 2–4 in number. *Leaf* 1–5.5 cm long by 0.05–0.2, rarely 0.35, cm wide, linear to lanceolate to semi-terete, apex obtuse to acute, apiculate, lamina erect to suberect, soft and thin to more or less rigid, leathery. *Inflorescence* a raceme, peduncle much abbreviated, terminal, usually from leafy growths. *Flower* 0.7–2.2 cm long, 1–3 (rarely 4) in number, simultaneous, resupinate, spreading widely and nearly flat, generally upright, ovary 5 winged, flowers long lasting. Flowers vary in colour from white, orange, yellow or yellowish-green to greenish-white, often with an orange to red lip.

Range, elevation and habitat: *Dendrobium masarangense* is found on New Guinea, Bougainville Island, Sulawesi, Fiji, the Solomon Islands, New Britain, Vanuatu, and New Caledonia, where it grows as an epiphyte on small twigs and branches, as well as tree crowns, in lowland montane forest, alpine forest and secondary vegetation. It can be locally abundant to uncommon, and is found at elevations of 300–3250 m. It is likely that plants bloom in any month.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or tree fern, using New Zealand *Sphagnum* moss around the roots. Plants may be potted in small pots using moss, but grow much better on mounts. *Temperature* warm to cold, depending on provenance of plants. If unsure, intermediate to intermediate-cool conditions are best. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet, and use the highest quality water possible, with low total dissolved solids. *Humidity* high. *Air* good to brisk, ensuring high humidity. *Propagation* by division, best with a good number of pseudobulbs, or seed. When fertilising, it is best to use 1/4 strength feed. The plants are not heavy feeders, and feeding encourages the faster break down of moss. If potted in moss, repot yearly.

Comments: Another jewel for the grower of miniatures, the variably coloured *Dendrobium masarangense* can be floriferous, with proportionately large flowers. Occasionally available, it is often expensive if so. The species comes from a wide elevational range in nature, but most plants should do well on the cusp of intermediate and cool conditions. Water quality for the plants, as for many of their close relatives in section *Oxyglossum*, should be high, else problems such as leaf drop or root loss may occur, leading to the demise of the plant. Quite a number of plants have been seen in the United States in recent years, but they are not always correctly identified. *Dendrobium sulphureum* has similar, usually larger flowers, particularly the



Figure 4.434 (above) Mounted plants of *Dendrobium masarangense* in bloom (Grower: Marni Turkel).



Figure 4.435 (above) The pretty flowers of *Dendrobium masarangense* in detail (Grower: Marni Turkel).

DENDROBIUM

whitish forms with orange-red lips, but plants of this species also tend to be larger, with more rigid, broader leaves. Plants of *D. masarangense* are similar to *D. cyanocentrum* and *D. subuliferum* when out of bloom, but there can be no uncertainty when flowers are present.

There are two subspecies of *D. masarangense*; the nominate form usually has white flowers and a small amount of yellow to orange on the lip apex, frequently with the mentum curved inward, and generally hails from lower elevations (300–1200 m). The other subspecies, ssp. *theionanthum* (Schltr.) T.M.Reeve & P.Woods, comes mainly from elevations over 1500 m, occasionally down to 1100 m, and as high as 3250 m, and occurs in a wider range of colours.

The differences, which are not great, are mostly in colouration and altitudinal distribution. The orange form mentioned above was found once near *D. decockii* and is possibly a natural hybrid. *Dendrobium masarangense* can bloom in any month of the year and the flowers can be very long-lasting, up to a number of months.



Figure 4.436 (above) A mass of *Dendrobium masarangense* flowers put on an attractive display. This particular variety has deeply coloured lip apices that contrast beautifully with the white of the flowers (Grower: Russ Varnado).

DENDROBIUM

Dendrobium microbulbon A.Rich.

Publication: *Ann. Sci. Nat., Bot., II*, 15: 19 (1841)

Etymology: From the Greek *micro* (tiny) and *bulbo* (bulb), with reference to the tiny pseudobulbs.

Homotypic synonym: *Callista microbulbon* (A.Rich.) Kuntze.

Heterotypic synonyms: *Dendrobium humile* Wight, nom. illeg., *Dendrobium crispum* Dalzell.

Morphology: *Plant* 4–7 cm tall, clustered, branching, erect. *Pseudobulb* 1–2 cm tall by up to 1 cm wide, elliptic-oblong to conical to ovoid, distinctly compressed, sheathed, elongate before flowering, 1 leaf-like bract, leaves 1–3, apical, annually deciduous. *Leaf* to 7 cm long by up to 0.7 cm wide, sessile, linear to lanceolate to oblong-lanceolate, apex acute, lamina soft, thin textured. *Inflorescence* a raceme, 2–10 cm long, erect, occasionally branching, one to two simultaneous inflorescences, erect to suberect, slender, terminal and subterminal, flowers secund, each flower with a minute subtending bract, generally from leafy pseudobulbs. *Flower* 0.7–1.3 cm, to 10 in number, simultaneous, resupinate, spreading, campanulate, fragrant. Flowers white with lip almost entirely white, to white with pink or rose coloured stripes of various widths on side-lobes and edges of mid-lobe.

Range, elevation and habitat: *Dendrobium microbulbon* is found in western India (Deccan, Konkan, Western Ghats and North Kanara areas), where it grows at elevations around 1220 m. Records of bloom-times in nature indicate July and August, as well as December to January. Conservation status unknown.



Figure 4.437 (above) An elegant spray of *Dendrobium microbulbon* flowers. The lips and lobes of this Indian taxon may be beautifully marked with pink to rose coloured pigment (Grower: Brad Cotten).

DENDROBIUM

Culture recommendations: *Substrate* mount on cork-bark, rough-barked hardwood, small rough wood shingles or tree fern, using New Zealand *Sphagnum* moss. This species may also be potted in small pots or baskets using a fast-draining bark mix, but moss is not recommended for plants requiring a prolonged drier period as moss can be difficult to re-wet. *Temperature* intermediate. *Light* bright diffuse to bright shade. *Watering* keep moist during the growing season, well drained, not wet. Start to reduce water in autumn or when bulbs mature, keeping plants much drier during winter, occasionally misting the roots. *Humidity* high during growth, approximately 70 % while resting. *Air movement* good to brisk. The white flowers are subject to *Botrytis* when air movement is insufficient. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength during the growing season, then withhold food during dormancy. Any disturbance of plants, such as remounting or repotting, should be carried out in spring when new growths and roots start to appear.

Comments: *Dendrobium microbulbon* is a truly charming species. The white flowers are somewhat small, but have arresting, beautiful, pinkish to rosy-red markings on the side-lobes of the lip. Growing best mounted, the plants should be hung high in the greenhouse with good air movement.

Still somewhat uncommon in cultivation, this species, like many members of section *Stachyobium*, is worth the effort needed to maintain it in a collection. The exquisite flowers have the added bonus of being long-lasting and fragrant, sometimes quite strongly so. Although in nature the flowers are seasonal, plants in cultivation may bloom in almost any month.



Figure 4.438 (above) Mounted *Dendrobium microbulbon* plants in flower are very pretty, producing arresting displays. The long lasting and fragrant flowers make this taxon well worth growing (Grower: Brad Cotten).

DENDROBIUM

Dendrobium pachyphyllum (Kuntze) Bakh.f.

Publication: *Blumea* 12: 69 (1963)

Etymology: From the Greek *pachy* (thick-skinned) and *phyllo* (leaves), a reference to the leathery leaves.

Homotypic synonyms: *Callista pachyphylla* Kuntze.

Heterotypic synonyms: *Desmotrichum pusillum* Blume, *Dendrobium pusillum* (Blume) Lindl., nom. illeg., *Dendrobium pumilum* Roxb., nom. illeg., *Dendrobium carnosum* Teijsm. & Binn., nom. illeg., *Callista pumila* Kuntze, *Callista pusilla* (Blume) Kuntze, *Dendrobium borneense* Finet, *Polystachya pumila* (Kuntze) Kraenzl., *Desmotrichum pumilum* (Kuntze) A.D.Hawkes, *Dendrobium pisibulbum* Guillaumin, *Flickingeria pumila* (Kuntze) A.D.Hawkes, *Dendrobium perpusillum* N.P.Balakr., *Bolbidium pumilum* (Kuntze) Brieger, *Bolbidium pusillum* (Blume) Rauschert.

Morphology: Plant to 10 cm tall, clustered, much branched, slowly creeping, forming dense clumps, leaves opposite. *Pseudobulb* 3–6 cm tall, base slender, narrow, club shaped, bifoliate. *Leaf* to 2 cm long by up to 0.8 cm wide, oblong to ovate, apex round to obtuse, lamina suberect to spreading, fleshy, succulent, leathery. *Inflorescence* a raceme, peduncle much abbreviated, pseudobulbs bloom repeatedly, sometimes more than one simultaneous inflorescence per cane, terminal from fascicle-like structure at apex of cane. *Flower* 1–2 cm long, single, resupinate, spreading widely, pedicellate ovary to 0.7 cm, mentum proportionately huge, flowers extremely short lived, rarely more than 24 hours. Flowers can vary from whitish with purplish veins to rarely pure white, but the lip always has a yellow to greenish yellow callus near its apex.

Range, elevation and habitat: *Dendrobium pachyphyllum* is very widespread and locally abundant throughout most of southeast Asia, with records of collection from Peninsular Malaysia, Borneo, northeast India, Bangladesh, Myanmar, Thailand, Vietnam, Sumatra, Java and other Indonesian islands. It grows as an epiphyte low on tree trunks in high light situations in lowland to mid-elevation moist forest, swamp, primary forest (rarely) and often in urban situations. It occurs at elevations from near sea level to 2100 m. It can bloom at any time of the year in nature, frequently after sudden drops in temperature due to weather changes.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or tree fern. This species may also be potted in small pots or baskets using a fast-draining fine bark mix or New Zealand *Sphagnum* moss. *Temperature* warm to intermediate. *Light* bright diffused. *Watering* keep moist and well drained, not wet, though plants are not harmed by brief dryness. Water somewhat less frequently in winter, particularly in areas with prolonged, overcast days. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, reducing frequency and strength during winter.



Figure 4.439 (above) The finely veined bloom of *Dendrobium pachyphyllum* (Grower: Brad Cotten).



Figure 4.440 (above) Leaves and flowers of *Dendrobium pachyphyllum* (Grower: Brad Cotten).

DENDROBIUM

Comments: *Dendrobium pachyphyllum* is closely related to *D. hymenanthum*, being similar in both plant and flower, and as mentioned in the text for *D. hymenanthum*, the two species are much confused in both literature and collections. The blooms of *D. pachyphyllum* tend to open more widely and are much more colourful, with the peppermint-striped forms considered to be the most desirable. Additionally, the flowers are surprisingly fragrant, helping to offset the fact that they only last a single day. Even so, the plants bloom frequently and repeatedly from the same pseudobulbs, and even a small specimen can be highly attractive. This species belongs to section Bolbidium.



Figure 4.441 (above) Two *Dendrobium pachyphyllum* blooms in detail. This taxon is relatively widespread across southeast Asia (Grower: Brad Cotten).

DENDROBIUM

Dendrobium parvulum Rolfe

Publication: *Bull. Misc. Inform. Kew* 1899: 127 (1899)

Etymology: From the Latin *parvulum* (very small) referring to the size of the plant.

Homotypic synonyms: *Sarcopodium parvulum* (Rolfe) Kraenzl., *Katherinea parvula* (Rolfe) A.D.Hawkes, *Dendrobium delicatulum* ssp. *parvulum* (Rolfe) T.M.Reeve & P.Woods.

Heterotypic synonyms: *Dendrobium delicatulum* F.Muell. & Kraenzl., nom. illeg., *Dendrobium minutum* Schltr., *Dendrobium delicatulum* ssp. *huliorum* T.M.Reeve & P.Woods, *Pedilonum minutum* (Schltr.) Rauschert, *Dendrobium parvulum* ssp. *huliorum* (T.M.Reeve & P.Woods) Ormerod, *Dendrobium parvulum* ssp. *minutum* (Schltr.) Ormerod.

Morphology: *Plant* 1–2 cm tall, occasionally to 4.5 cm, mat-forming, sometimes broadly so, pseudobulbs close set or up to 1 cm between pseudobulbs. *Pseudobulb* 0.2–1.5 cm tall by 0.2–0.9 cm wide, globose, ellipsoid, ovoid or occasionally obovoid, yellowish green to dark reddish depending upon exposure, enclosed with clasping bracts, erect to oblique, leaves terminal, 2 in number. *Leaf* 0.3–1.5 (rarely to 2) cm long by 0.2–0.8 cm wide, ovate to elliptic to oblong elliptic, apex acute to rounded, apiculate, lamina spreading, fleshy, leathery, sometimes flushed with red. *Inflorescence* a raceme, peduncle much abbreviated, terminal, from leafless and leafy stems. *Flower* 0.7–1.5 cm long, 1–3 in number, simultaneous, resupinate, not spreading widely, upright and facing inward towards each other, thick textured, relatively long lasting. Flowers vary in colour from creamy white to pinkish-purple, red, violet or blue.

Range, elevation and habitat: *Dendrobium parvulum* is a widespread and locally common species found in Sulawesi, New Guinea, Bougainville, the Solomon Islands, the Caroline Islands, Fiji and Vanuatu at elevations of 600–2650 m. This species grows as an epiphyte on tree trunks and smaller branches in moist, montane forest. It may also grow terrestrially, albeit rarely, and occasionally on rocks. Flowers may occur at any time, but there is a peak of bloom between October and April.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles, and possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not suited to potted culture due to its mat-forming, creeping plant habit. *Temperature* intermediate to cool, depending on plant provenance. *Light* bright shade. *Watering* keep moist, well drained, not wet. Use highest quality water possible, low in total dissolved solids. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. Seed set should be encouraged on coloured forms in cultivation. *Fertilise* at 1/4 strength weekly.



Figure 4.442 (above) A fine specimen of *Dendrobium parvulum* 'Eichenfels' (Grower and Photo: Darrin Norton, Mountain Orchids).



Figure 4.443 (above) A whitish variant of *Dendrobium parvulum* (Grower: MarniTurkel).

DENDROBIUM

Comments: For many years, this tiny member of section *Oxyglossum* was called *Dendrobium delicatulum*, and many if not most plants in cultivation are labelled as such. There is quite a degree of variation in both the size and colour of the flowers, but the steely-blue form with the red lip is probably the most popular. The blooms of the white forms (formerly ssp. *huliorum*) tend not to open fully and are often cleistogamous (self-pollinating), so it is wise to purchase this species in bloom to be sure of quality flowers.

The plant is quite attractive with its small, round pseudobulbs topped by the pair of spreading leaves, but its creeping habit requires that it be grown on a mount. In nature, plants have been observed to form mats up to one metre across. *Dendrobium parvulum* may bloom in any month in cultivation and flowers can remain open for 3–4 months.



Figure 4.444 (above) A pair of fine, blue *Dendrobium parvulum* 'Eichenfels' blooms with a striking red lip. This colour form is understandably amongst the most popular for this taxon (Grower: Cindy Hill).

DENDROBIUM

Dendrobium peguanum Lindl.

Publication: *J. Proc. Linn. Soc., Bot.* 3: 19 (1859)

Etymology: From Pegu, now Bago, a city and eponymous region of Myanmar.

Homotypic synonyms: *Dendrobium pygmaeum* Lindl., nom. illeg., *Callista pygmaea* Kuntze, *Dendrobium wallichii* A.D.Hawkes & A.H.Heller, nom. illeg.

Heterotypic synonym: *Dendrobium fesselianum* M. Wolff.

Morphology: Plant 3–12 cm tall, clustered, erect. *Pseudobulb* 1.5–6 cm tall by 1–2 cm wide, ovoid to globular to oblong-conical, enclosed in papery bracts, 2–4 leaves towards apex, annually deciduous. *Leaf* to 7.5 cm long by up to 1.5 cm wide, sessile, broadly elliptic to linear-oblong, apex acute to sub-acute, lamina leathery, fleshy. *Inflorescence* a raceme, to 7 cm long, 1–3 simultaneous inflorescences, borne near apex of pseudobulb, usually shortly after leaf fall. *Flower* 0.8–1.2 cm tall, to 12 in number (more in cultivation), simultaneous, resupinate but randomly arranged, spreading, campanulate.

Range, elevation and habitat: *Dendrobium peguanum* grows as an epiphyte on shrubs and the thick branches of semi-deciduous trees, and as a lithophyte on rocks, usually near water courses, in warm, humid lowland forests. It occurs at elevations between 300–400 m in Thailand, India (Sikkim, Orissa, Jaspur, Gujarat (the Dangs), Konkan, West Ghats and North Kanara) and Myanmar. It is considered very rare in Sikkim and the northeast Himalayas. This species typically blooms from October to February, but in India it blooms between March and April.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. It may also be potted in small pots or baskets using a fine bark mix or moss. Moss is hard to re-wet, so it may not be the best choice for plants such as these that require a dry rest. *Temperature* warm to hot during the growing season, but cool during dormancy, down to 10 °C (50 °F) in winter. *Light* bright shade during growing season, bright diffuse during dormancy. *Water* keep moist during growth, well drained, not wet, but diminish water during autumn or as pseudobulbs mature, with occasional misting of the roots during winter dormancy. *Humidity* high during growth, slightly less during winter rest. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly whilst in growth, but withhold fertiliser when dormant. If growing this plant in moss, repot yearly in spring when new growths and roots appear.

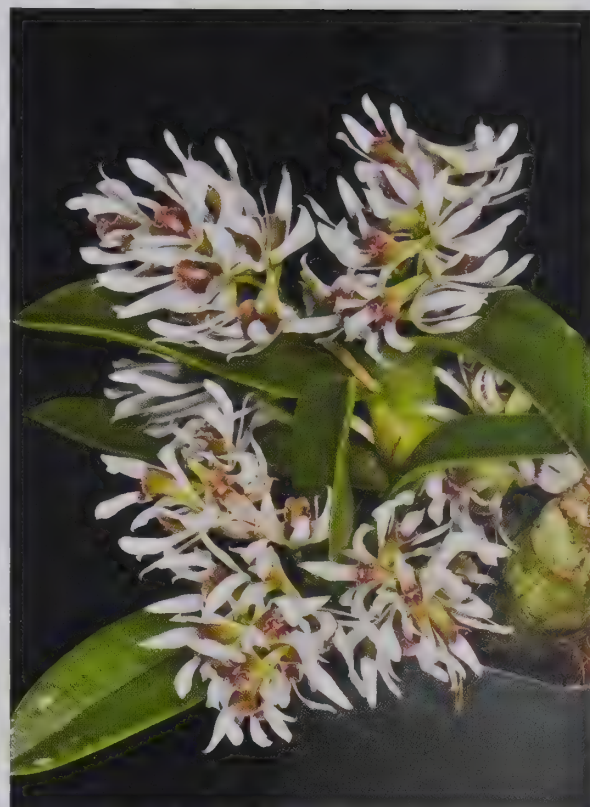


Figure 4.445 (above) Congested masses of *Dendrobium peguanum* flowers (Grower: Napa Valley Orchids).



Figure 4.446 (above) *Dendrobium peguanum* blooms come in a number of colour forms (Grower: Gold Country Orchids).

DENDROBIUM

Comments: *Dendrobium peguanum* is a wonderful miniature, one of several belonging to section *Stachyobium*, though it does not obviously resemble its relatives. The congested, stout inflorescence is packed with beautiful, frilly-lipped flowers with greenish and purple markings, with the added bonus of a lovely fragrance. Many people find this species difficult to keep alive for long, but the problems usually lie in not keeping plants moist and warm during growth, or cool and relatively dry during the necessary dormancy. Plants in cultivation bloom between early autumn and late winter.



Figure 4.447 (above) A lateral inflorescence of *Dendrobium peguanum* bearing numerous simultaneous flowers (Grower: Napa Valley Orchids).

DENDROBIUM

Dendrobium porphyrochilum Lindl.

Publication: *J. Proc. Linn. Soc., Bot.* 3: 18 (1859)

Etymology: From the Greek *porphyros* (purple) and *cheilos* (lip) referring to the lip.

Homotypic synonym: *Callista porphyrochila* (Lindl.) Kuntze.

Heterotypic synonym: *Dendrobium caespitosum* King & Pantl.

Morphology: *Plant* 3–9 cm tall, clustered, slowly creeping, branching, erect. *Pseudobulb* 1–4 cm tall by up to 0.8 cm wide, narrowly conical to narrowly ovoid to subfusiform (tapering towards apex), covered with papery sheaths, leaves distichous, apical, 2–4 in number, annually deciduous. *Leaf* 2.5–7 cm long by 0.5–1.5 cm wide, narrowly ovate, apex acute to obtuse, lamina suberect to somewhat spreading, slightly arcuate, fleshy, thinly leathery. *Inflorescence* a raceme, 4–8 cm long, rachis longer than peduncle, inflorescence longer than leaves, 2–3 simultaneous inflorescences, suberect to descending, subterminal. *Flower* 0.8–1 cm wide, many in number, simultaneous, orientated with lip towards the peduncle, spreading, campanulate, nodding. Flowers vary in colour from yellowish to greenish, and in the number and width of stripes on the sepals and petals.

Range, elevation and habitat: A widespread and, in some areas, locally abundant species, *Dendrobium porphyrochilum* is nonetheless regarded as threatened in parts of its range. It grows in Myanmar, India (Khasia and Sikkim, 1700–2300 m), Nepal, Bhutan, southern China (west Yunnan and Guangdong provinces, to 2700 m), western and northern Thailand and northern Vietnam at elevations ranging from 800–2700 m. It grows as a canopy epiphyte on very mossy branches of trees and shrubs, as well as a lithophyte on mossy rocks in open, seasonal montane forest, and is often deciduous. It blooms between December and June in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or tree fern using New Zealand *Sphagnum* moss around the roots. This species may also be potted in small pots or baskets using a fast-draining fine bark mix or moss. If potted in moss, repot yearly when new growths and roots appear. *Temperature* intermediate while growing, but cool during dormancy, to 10 °C (50 °F). *Light* bright diffuse. *Water* keep moist and well-drained, not wet, during growth. Water less frequently as pseudobulbs mature or in autumn, misting the roots occasionally during winter dormancy. *Humidity* high whilst growing, average (~60 %) during dormancy. *Air movement* good to brisk. *Propagation* division or seed. *Fertilise* at 1/4 to 1/2 strength weekly while growing, but withholding fertiliser while dormant.

Comments: An uncommon species in cultivation, *Dendrobium porphyrochilum* should be more widely grown. The flowers are an unusual



Figure 4.448 (above) *Dendrobium porphyrochilum* produces strikingly coloured flowers (Grower: Mary Gerritsen).



Figure 4.449 (above) The widely spreading blooms of *Dendrobium porphyrochilum* in detail (Grower: Mary Gerritsen).

DENDROBIUM

colour, often marked with bold, contrasting stripes, and the densely flowered inflorescences are exquisite. This member of section *Stachyobium*, like so many of its relatives, requires a warm growing season and a distinctly cooler dormancy; these culture requirements are key and should be closely adhered to for success. Plants in cultivation have been seen in bloom in mid-summer, autumn and late winter.



Figure 4.450 (above) A descending inflorescence of *Dendrobium porphyrochilum* bearing many attractive flowers. This warm growing species remains uncommon in cultivation (Grower: Mary Gerritsen).

DENDROBIUM

Dendrobium schneiderae F.M.Bailey

Publication: *Occas. Pap. Queensland Fl.* 1: 7 (1886)

Etymology: Named for the original collector, Mrs. H. Schneider.

Homotypic synonym: *Australorchis schneiderae* (F.M.Bailey) Brieger.

Morphology: Plant to 10 cm tall, pseudobulbs closely set, clumping, branching. *Pseudobulb* 1–2.5 cm tall by 0.7–1.5 cm wide, conical to ovoid, shallowly ribbed, leaves subterminal 1–3 in number. *Leaf* 2.5 – 8.5 cm long by 0.5–0.8 cm wide, oblong, apex obtuse to sub-acute, lamina erect to suberect, stiff, thinly leathery. *Inflorescence* a raceme, 6–10 cm long, arching downwards to pendent, slender, flowers subterminal on mature pseudobulbs. *Flower* 0.7–0.9 cm long, to 25 in number, simultaneous, resupinate, spreading, campanulate, fragrant. Flowers vary from yellowish to occasionally pinkish or reddish. The nominate variety usually has definite thin reddish edging to the segments.

Range, elevation and habitat: *Dendrobium schneiderae* is a widespread yet uncommon eastern Australian species that occurs in northeast New South Wales, and north to southeast and central Queensland, particularly in the MacPherson Range, at elevations near 450 m. It typically grows as an epiphyte and is usually found on the upper branches and trunks of large rainforest trees, particularly Hoop Pines (*Araucaria cunninghamii*). It also grows in stunted cloud forest, usually on the undersides of branches and often in dense moss. Occasionally, plants may be found growing lithophytically on rocks. *Dendrobium schneiderae* var. *major* occurs as a disjunct population in Eungella, Queensland; it is a larger plant with a longer inflorescence that bears more flowers than the nominate taxon. This variety has even been found on Alexander Palms (*Archontophoenix alexandrae*). Plants in nature usually bloom between February and April.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or tree fern using little or no New Zealand *Sphagnum* moss around the roots. Pots may be used, but descending inflorescences are often longer than the pots are tall; plants are therefore more attractive on a mount. *Temperature* cool intermediate to cool. Plants will tolerate temperatures to near freezing for short periods in winter, but are best kept above 5 °C (40 °F). *Light* bright diffuse. Keep plants high in the greenhouse or shade house, but protect from burning. *Water* keep moist, allowing plants to dry between waterings. Less frequent watering is best during the winter. *Humidity* average to high (approximately 65 %) *Air movement* good to brisk. *Propagation* division or seed. Feed 1/4 to 1/2 strength weekly while growing, reducing or withholding food whilst dormant.

Comments: *Dendrobium schneiderae* is one of the smallest of the Australian *Dendrobium*, and although it is available outside of that country, it is still relatively uncommon in collections. Although the flowers are fairly small,



Figure 4.451 (above) The delicate blooms of *Dendrobium schneiderae* are widely spreading (Grower: Mary Gerritsen).

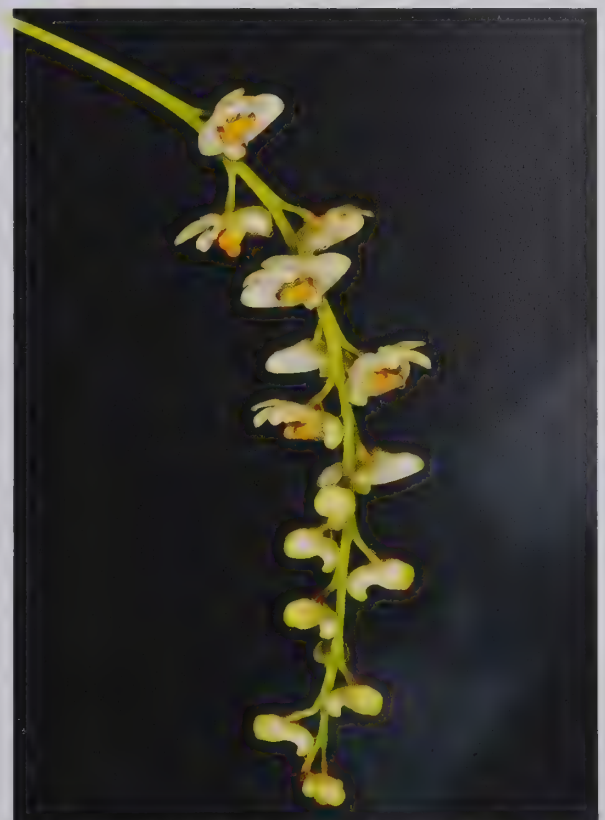


Figure 4.452 (above) An elegantly descending *Dendrobium schneiderae* inflorescence (Grower: Mary Gerritsen).

DENDROBIUM

they have an elegant shape, often with an attractive, contrasting margin of reddish colour, and are fragrant. The pendent inflorescences display well when plants are grown on a mount. *Dendrobium schneiderae* belongs to the small section Monophylleae. The species blooms in late summer to early autumn in the northern hemisphere, but blooming plants have also been seen in mid to late winter.



Figure 4.453 (above) The ribbed pseudobulbs and stiff leaves of mounted *Dendrobium schneiderae* plants (Grower: Mary Gerritsen).

DENDROBIUM

Dendrobium seranicum J.J.Sm.

Publication: *Bull. Jard. Bot. Buitenzorg, III*, 10: 150 (1928)

Etymology: From Seram (also called Seran or Serang), the largest island of Maluku province, Indonesia.

Homotypic synonym: *Pedilonum seranicum* (J.J.Sm.) Rauschert.

Morphology: *Plant* to 12 cm tall, clumping, rhizome branching, somewhat ascending, sometimes tuft forming, pseudobulbs close set to 4.5 cm apart, erect. *Pseudobulbs* 0.5–2.5 cm tall by 0.2–0.6 cm wide, ovoid to fusiform, clavate, leaves terminal, distichous, 2–4 in number. *Leaf* 1.2–7.2 cm long by 0.2–0.5 cm wide, linear to narrowly lanceolate to ligulate, apex obtuse to acute, lamina erect to suberect, flat to arcuate, thick, fleshy, channelled on dorsal surface. *Inflorescence* a raceme, much abbreviated, 1–2 simultaneous inflorescences, terminal from apex of pseudobulbs. *Flower* 1.8–2.4 cm long, 1–4 in number, simultaneous, resupinate, upright and facing inwards towards each other, spreading to widely spreading, relatively long lasting. The lip of this species occasionally has faint orange colouration, but is more typically darker pink.

Range, elevation and habitat: *Dendrobium seranicum* is endemic to the island of Seram (Maluku (Moluccas), Indonesia), where it grows on Mount Murkele at elevations of 1000–1900 m as an epiphyte in moist, montane forest. Plants presumably flower in any month in nature, as they do in cultivation.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood, small rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* around the roots. It may also be potted in moss or an open fine bark mix. If potted in moss, repot yearly. *Temperature* intermediate to intermediate-cool, to 26 °C (80 °F) in the day and 13 °C (55 °F) at night. *Light* bright shade. *Watering* keep moist, well drained, not wet. Use the highest quality of water possible, low in total dissolved salts. *Air movement* good. *Humidity* high. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: This lovely species, whilst found in some collections in the United States, would certainly not be described as common. A member of section *Oxyglossum*, *Dendrobium seranicum* comes from an unusual locale for this predominantly New Guinean group. The delicate pink flowers of this species lack the variation seen in most close relatives, nor are they as long-lived as others in this section. Even so, they still remain open for weeks and may bloom at any time of year. If obtained, this species should be propagated and distributed so that more growers can share in its beauty.



Figure 4.454 (above) *Dendrobium seranicum* is endemic to Seram, an island in Indonesia (Grower: John Leathers).



Figure 4.455 (above) A pretty, light pink variety of *Dendrobium seranicum* (Grower: Marni Turkel).

DENDROBIUM

Dendrobium stellare Dauncey

Publication: *Harvard Pap. Bot.* 7: 171 (2003)

Etymology: From the Latin *stellare* (with spreading rays, star like) referring to the flower shape.

Morphology: *Plant* to 14 cm long, clustered, branching, descending to pendent. *Pseudobulb* 4–12 cm long by up to 0.8 cm wide, cane-like, thin at base, clavate towards apex, wrinkled with age, blackish-green, leaves several in number, distichous, distal, eventually deciduous. *Leaf* to 3 cm long by up to 0.7 cm wide, narrowly oblong to narrowly ovate to ligulate, apex acute to obtuse, unevenly minutely bilobed, lamina spreading, soft textured, thinly leathery, fleshy. *Inflorescence* a raceme, much abbreviated, pendent, up to 3 simultaneous inflorescences, occasionally more, terminal and subterminal and rarely along lower nodes of cane. *Flower* 1.5–2 cm long by 1–1.2 cm wide, to 10 in number, simultaneous, pendent, facing downwards, proportionately long, narrow, sepaline tube with segments flaring abruptly at apex, funnel shaped (infundibuliform) in profile, somewhat long-lived (2–3 weeks). Flowers vary in colour from nearly white to light mauve, but with dark violet blotches on anther.

Range, elevation and habitat: *Dendrobium stellare* is an uncommon species, found at elevations of 1600–2100 m in Java (provinces of East Java and Central Java) in somewhat stunted, moist, montane forest, often on branches of *Engelhardia spicata*. It flowers in December in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or tree fern with New Zealand *Sphagnum* moss around the roots. This species is not well suited to potted culture due to its pendent nature. *Temperature* intermediate to cool, with days to 70 °F/21 °C and nights best near 55 °F/13 °C. Do not expose plants to high heat. *Light* bright shade, if grown brighter, make sure that humidity is high. *Watering* keep moist, well-drained, not wet. Use the highest quality water possible, low in total dissolved solids; water slightly less during winter and allow mounts to approach dryness. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength, a lesser strength being preferable.

Comments: Not particularly common in cultivation, *Dendrobium stellare*, of section Pedilonum, is a truly lovely species; a plant in full bloom is a striking sight indeed. The pendent flowers, approximately 2 cm long, range from nearly white through pale pink to a light, bluish-mauve, the latter being a colour of particular appeal. In common with most species in this section, the flowers bloom in clusters from the older, leafless canes, and most frequently at or near the apex. Plants of this species have been sold as *D. malvicolor* (q.v.). A very similar Sumatran species, *D. sidikalangense* Dauncey, is distinguished by its longer canes, to 25 cm tall, and flowers, which have a differently shaped lip, shorter mentum,

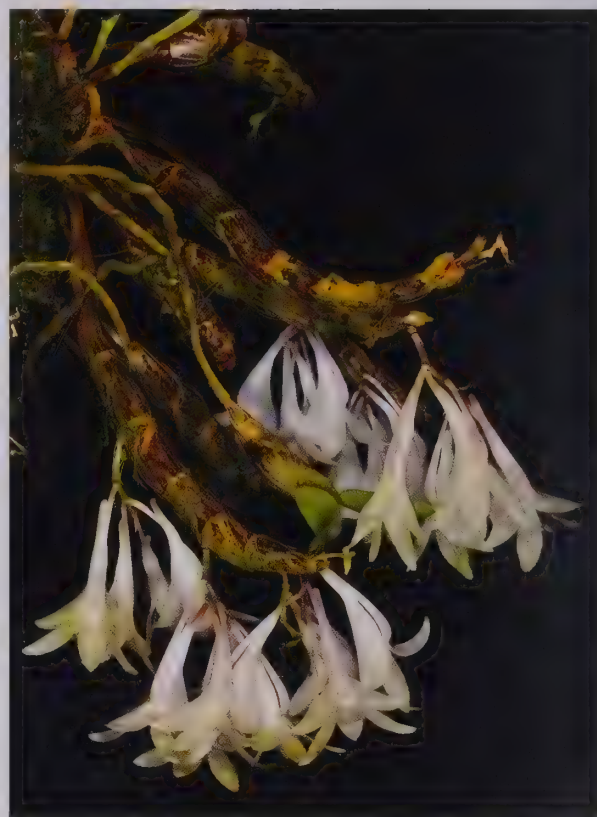


Figure 4.456 (above) The wonderful, pendent blooms of *Dendrobium stellare*, of Java, Indonesia (Grower: Cindy Hill).



Figure 4.457 (above) *Dendrobium stellare* flower detail, as seen from below (Grower: Cindy Hill).

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and pale mauve blotches on the anther. *Dendrobium stellare* blooms in cultivation most frequently during late spring to mid-summer, but occasionally also at other times.



Figure 4.458 (above) A delicate profusion of flowers almost obscures the green mass of mounted *Dendrobium stellare* plants. A specimen such as this presents a striking sight indeed (Grower: Ron Parsons).

DENDROBIUM***Dendrobium subuliferum* J.J.Sm.****Publication:** *Bull. Jard. Bot. Buitenzorg, II*, 2: 15 (1911)**Etymology:** From the Latin *subulatus* (awl shaped), a reference to the morphology of the leaves.**Homotypic synonym:** *Pedilonum subuliferum* (J.J.Sm.) Rauschert.**Heterotypic synonym:** *Dendrobium subuliferum* var. *gautierense* J.J.Sm.**Morphology:** *Plant* 2–10 cm tall, much branched, suberect or tufted, rhizome often ascending in habit, mat-forming, pseudobulbs close set to 1 cm apart. *Pseudobulb* 0.5–2.5 tall by 0.15–0.35 cm wide, ovoid to narrowly fusiform, leaves apical, distichous, 2–4 in number. *Leaf* 1–5 cm long by 0.75–2 mm wide, ligulate, apex acute to obtuse, sometimes apiculate, lamina conduplicate, erect to suberect, thinly leathery, usually rigid, sometimes minutely papillose. *Inflorescence* a raceme, peduncle much abbreviated, terminal, usually from leafy growths. *Flower* 1.2–1.8 cm wide, 1, rarely 2, in number, simultaneous, resupinate, upward facing, spreading widely, sometimes fragrant. Flowers vary in width of segments and some have segments with green tips. Plants from the Vogelkop Peninsula have relatively small flowers with purplish striations (Reeve & Woods, 1989).**Range, elevation and habitat:** *Dendrobium subuliferum* is an uncommon species endemic to New Guinea, occurring at elevations of 300–2000 m, where it grows as an epiphyte, occasionally as a terrestrial, in primary and secondary moist, montane forest. No bloom-time records for this species are available, but it presumably blooms in any month, with periodic flushes of flowers. *Dendrobium subuliferum* occasionally grows with *D. cyanocentrum* in parts of its range.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingle or tree fern, using New Zealand *Sphagnum* moss around the roots. This species may also be potted using moss or possibly a fine bark mix. This species seems**Figure 4.459 (above)** The attractive growths and blooms of *Dendrobium subuliferum* 'Snowtop' (Grower: Cindy Hill).

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to perform best when potted in moss. *Temperature* intermediate to intermediate-cool, probably best kept above 15 °C (58 °F) at night. *Light* bright shade. *Watering* keep moist, well drained, not wet. Use the highest quality water available, low in total dissolved solids. *Air movement* good. *Humidity* high. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: Most species in the section *Oxyglossum* are highly prized, and this one is no exception. The clear white flowers with their full shape, carpeting the handsome tuft of leaves, are sure to enthrall any of those who see it. For many years, only a few select growers possessed *Dendrobium subuliferum* in their collections. It is fortunately now more common due to the dispersal of divisions and the appearance of seed-raised plants in the marketplace. Though not an easy species to grow, with the proper conditions *D. subuliferum* can grow fairly rapidly, branching frequently and forming clumps. Some individuals are lightly fragrant, a trait shared with its close relative *D. cyanocentrum* (q.v.). In cultivation, plants tend to bloom between autumn and mid-winter, but flowers may appear at other times.

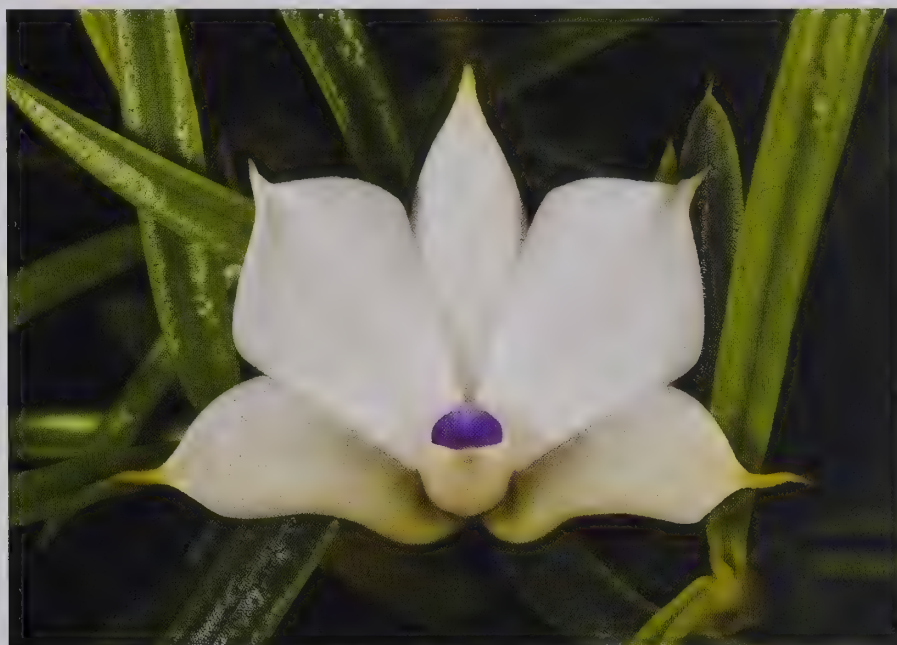


Figure 4.460 (above) A fine *Dendrobium subuliferum* bloom (Grower: Marni Turkel).

Figure 4.461 (below) *Dendrobium subuliferum* 'Snowtop' flowers (Grower: Marni Turkel).

DENDROBIUM

Dendrobium sulphureum Schltr.

Publication: *Repert. Spec. Nov. Regni Veg. Beih.* 1: 534 (1912)

Etymology: From the Latin *sulphureus* (yellow), with reference to the flower colour.

Homotypic synonym: *Pedilonum sulphureum* (Schltr.) Rauschert.

Morphology: Plant 2–13 cm tall, erect to semi-pendent, forming tufted clumps to 15 cm or more across. *Pseudobulb* 0.3–10 cm tall by 1–5 mm wide, leaves apical, distichous, 1–8 in number. *Leaf* 0.4–5 cm long (occasionally longer) by 1–6 mm wide, narrowly elliptic to oblanceolate to linear, apex obtuse to acute, lamina arcuate, erect to suberect, soft textured and flexible to leathery and rigid, margins occasionally undulate. *Inflorescence* a raceme, peduncle much abbreviated, terminal, blooms on growths with or without leaves. *Flower* 1.4–2.5 cm long, 1–2 (occasionally to 4) in number, simultaneous, resupinate, widely spreading and nearly flat, flowers may face each other or be side by side and facing different directions, upright, ovary triangular. Flowers vary from creamy-white through bright or greenish-yellow, with a bright red-orange apex to the lip, which itself may be green to blackish-green or, rarely, yellow.

Range, elevation and habitat: *Dendrobium sulphureum* occurs in New Guinea, where it grows as an epiphyte on the trunks, crowns and twigs of *Dacrydium* (*Podocarpus*) *compactus*, on trunks and branches of *Cordyline*, and also on tree ferns. It is found in montane cloud forest, on the edges of subalpine grassland, along forest margins, on trees in open grassland and on mossy rainforest trees at elevations of 800–3600 m, but more commonly above 1800 m. This species may be found with forms of *D. masarangense* and *D. vexillarius* J.J. Sm.. It blooms in any month in nature. Conservation status unknown, but likely to be secure.

Culture recommendations: *Substrate* mount on cork bark, rough barked hardwood, small, rough wood shingles or tree fern, using New Zealand *Sphagnum* moss around the roots. This species may also be grown potted with moss or a fine bark mix. These plants are best grown mounted, where water can drain quickly from the roots. *Temperature* intermediate-cool to cool to cold. Higher elevation plants may tolerate temperatures down to 7 °C (45 °F). *Light* bright diffuse to bright shade. *Watering* keep moist, and well-drained, not wet. Use the highest quality water possible, low in total dissolved solids. *Air movement* good to brisk. *Humidity* high. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, but do not overfeed. If grown in moss, report yearly.

Comments: Yet another uncommon species in cultivation, *Dendrobium sulphureum* (section *Oxyglossum*) is highly variable in both plant form and flower colour. In recent years, importations of fresh material have entered cultivation in the United States. There are three recognised

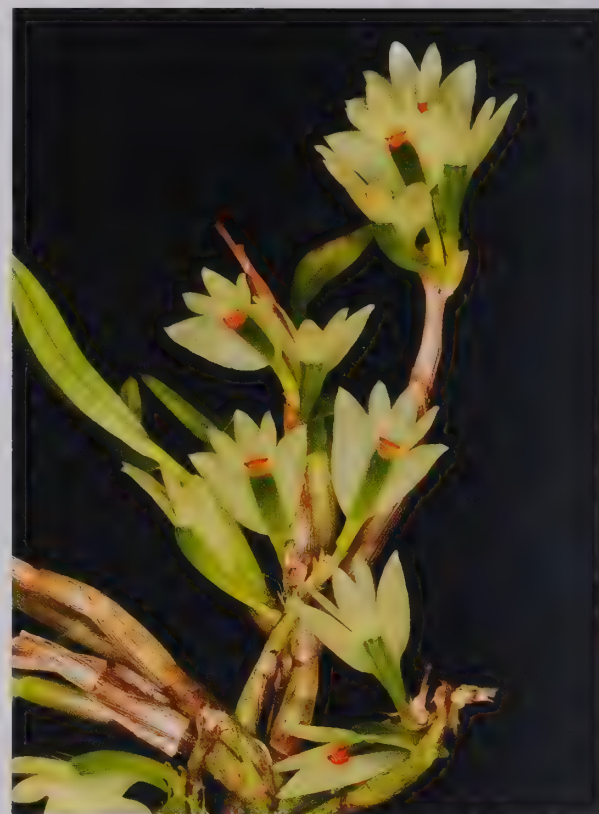


Figure 4.462 (above) The wonderfully contrasting flowers of *Dendrobium sulphureum* (Grower: Russ Varnado).



Figure 4.463 (above) *Dendrobium sulphureum* flower detail. This variety has a blackish lip (Grower: Marni Turkel).

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varieties of *Dendrobium sulphureum* (Reeve & Woods, 1989). The nominate race, var. *sulphureum*, is basically characterised by smaller flowers, longer, cylindrical pseudobulbs and less rigid, but spreading, leaves. The var. *rigidifolium* T.M.Reeve & P.Woods, like var. *sulphureum*, has longer pseudobulbs, but stiff and erect leaves and larger flowers.

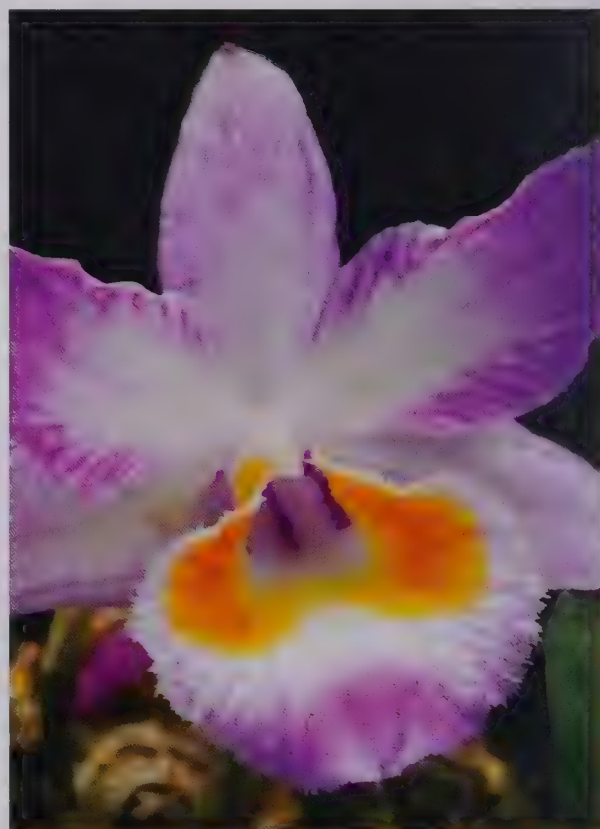
The last variety, var. *cellulosum* (J.J.Smith) T.M.Reeve & P.Woods, has smallish pseudobulbs, fewer leaves and proportionately larger flowers. Bear in mind that the varieties segue into one another, and it is probably best to avoid using varietal names for such a variable species. Regardless, this species is desirable in all forms. The flowers are relatively long-lasting, persisting for several weeks or more, and plants in cultivation may bloom in any season. *Dendrobium sulphureum* is similar to forms of *D. masarangense* (q.v.).



Figure 4.464 (above) A *Dendrobium sulphureum* flower with a dark green lip (Grower: Marni Turkel).



Figure 4.465 (above) *Dendrobium sulphureum* photographed *in situ* in Southern Highlands Province, Papua New Guinea, at an elevation of approximately 1600 m (Photo: Gary Yong Gee).

DENDROBIUM***Dendrobium wangliangii*** G.W.Hu, C.L.Long & X.H.Jin**Publication:** *Bot. J. Linn. Soc.* 157: 217 (2008)**Etymology:** Named for Liang Wang, orchid specialist and collector of the species.**Morphology:** *Plant* 1–3 cm tall, clustered, branching, prostrate. *Pseudobulb* to 3 cm tall by up to 0.8 cm wide, elliptic to fusiform to somewhat obovate, with prominent, swollen nodes, furrowed, covered in papery sheaths, purplish brown, pseudobulbs decumbent, arranged alternately in two rows, leaves distichous, 2–4 in number, near apex, annually deciduous. *Leaf* 1–2 cm long by 0.5–0.8 cm wide, sessile, elliptic, apex acute, lamina suberect to spreading, slightly revolute, thinly leathery. *Inflorescence* a raceme, peduncle to 0.7 cm long, suberect, subterminal, near apex of older, leafless pseudobulbs. *Flowers* 2.5–3.5 cm wide, single, resupinate, widely spreading, thin, crystalline textured, mentum saccate and slightly compressed, short-lived, ovary long pedicillate.**Range, elevation and habitat:** *Dendrobium wangliangii* is found in southwestern China (northern Yunnan province) at elevations around 2200 m. It grows as an epiphyte on a deciduous oak species, *Quercus yunnanensis*, in hot, dry canyons with mixed broadleaf deciduous and evergreen forests. In this habitat, there is a rainy season from May to October, followed by a distinct dry season. This species is very rare, with an extremely limited distribution thought to be of less than 1 hectare (ca. 2.47 acres), making this a species of concern. Plants bloom between May and June in nature.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles, probably not tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not well suited to potted culture due to its climbing, reclining habit. *Temperature* intermediate to warm whilst growing, but cool during dormancy. *Light* bright shade while growing, bright diffuse during dormancy. *Watering* plentiful and well-drained but not wet while growing, gradually reducing water as pseudobulbs mature or in the autumn; and misting roots occasionally during winter dormancy. Keep flowers dry. *Humidity* high during growth, average during dormancy. *Air movement* good to brisk. *Propagation* by division or seed. Seed production should be carried out to propagate and perpetuate this rare and desirable species in cultivation. *Fertilise* at 1/4 strength weekly during active growth, but withhold fertiliser during dormancy.**Comments:** *Dendrobium wangliangii* is one of the smallest members of section *Dendrobium*, and possibly one of the rarest as well. Described by Chinese botanists in 2008, there is already much concern over the fate of this species due to its extremely limited range, as well as poaching by unscrupulous collectors. One can only hope that other populations will be found before it is extirpated. Incredibly large for the size of the plant, the elegant, vibrantly coloured flowers are beautifully patterned and have an**Figure 4.466 (above)** The large and attractive flower of the rare *Dendrobium wangliangii* (Grower: Russ Varnado).**Figure 4.467 (above)** A study of the *Dendrobium wangliangii* flower (Photo: Gary Yong Gee).

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almost sugar-coated texture. The thin-textured flowers are unfortunately short lived, and care should be taken to keep water off the flowers as this will accelerate their passing.

If it can be obtained, growers are strongly urged to propagate this amazing species to safeguard its diversity in cultivation, particularly by setting seed between different clones, and possibly preserving the pollen for future use. In cultivation, plants of this taxon have been seen in bloom in the later summer.



Figure 4.468 (above) *Dendrobium wangliangii* flower detail. This fine taxon is extremely rare in nature and occur across a relatively small land area. Regrettably, it is threatened by poaching in its native Yunnan province, China, and the crossing of different clones in cultivation may be key to maintaining levels of genetic diversity *ex situ* (Grower: Andy's Orchids).

Group A

Species formerly in the genus *Cadetia*

Profile: Still considered a separate genus by many, including the authors, this group of over 80 epiphytic species occurs mostly in New Guinea, but is also found in Southeast Asia, India and Australia (northeast Queensland), usually in rainforest habitats.

General plant morphology: Sympodial, clumping, pseudobulbs crowded. *Pseudobulb* thin, cylindrical, unifoliate. *Leaf* leathery. *Inflorescence* terminal from a papery bract at apex of pseudobulb. *Flower* usually white to cream, produced sporadically, sepals much wider than petals, lateral sepals fused to the column foot, labellum 3-lobed, fixed to apex of column foot, hairy mid-lobe, ovary burr-like with soft green tubercles.



Figure 4.469 (above) An unidentified *Cadetia* group *Dendrobium* species from New Guinea (Grower: Hanging Gardens).

DENDROBIUM***Dendrobium chionanthum* Schltr.**

Publication: *Fl. Schutzgeb. Südsee, Nachtr.*: 157 (1905)

Etymology: From the Greek *chion* (snow, snowy) and *antha* (flower) referring to the white flower colour.

Homotypic synonym: *Cadetia chionantha* (Schltr.) Schltr.

Morphology: *Plant* to 5 cm tall, creeping, clump forming, much branched, mat-forming, pseudobulbs clustered. *Pseudobulb* to 2.5 cm tall by 0.2–0.4 cm wide, fusiform to nearly cylindrical, sometimes slightly broader near apex, shallow longitudinal sulcus on dorsal side, erect to suberect, leaf apical, unifoliate. *Leaf* to 2 cm long by 0.2–0.3 cm wide, sessile, somewhat conduplicate at base, narrowly oblong, sometimes narrowly ovate, apex obtuse to acute, apiculate, lamina suberect to spreading, semi-triquetrous, leathery, fleshy, rugulose. *Inflorescence* a raceme, peduncle minute, to two sequential inflorescences, terminal. *Flower* to 0.8 cm wide, single, resupinate, widely spreading, crystalline texture, petals proportionately small, proportionately long, pedicellate ovary to 1.5 cm, flower fragrant.

Range, elevation and habitat: A species from the Bismarck Range of Papua New Guinea at elevations of 1300–3000 m, *Dendrobium chionanthum* grows epiphytically, lithophytically and terrestrially, in colonies on trees, rocks and even roadside cuttings in cool, misty montane forest. This species flowers at any time of year, but blooming tends to peak in the spring. Conservation status unknown, but it is likely that this species is secure.

Culture recommendations: *Substrate* mount on cork bark, rough barked hardwood, small rough wood shingles or tree fern, using New Zealand *Sphagnum* moss around the roots. This species may also be grown potted with moss or a fine bark mix. *Temperature* intermediate to cool, keeping below 26 °C (80 °F) during the day, with 13 °C (55 °F) nights, but easily tolerating 10 °C (50 °F). *Light* bright shade. *Watering* keep moist, well drained, not wet, using the highest quality water possible, low in total dissolved solids. *Humidity* high *Air movement* good to brisk. *Propagation* by division or seed. This species resents disturbance so it is perhaps best not to divide plants in winter when the plants are not actively growing. *Fertilise* at 1/4 strength weekly. If potted in moss, replant yearly.



Figure 4.470 (above) Mounted *Dendrobium chionanthum* plants blooming simultaneously (Grower: Marni Turkel).

DENDROBIUM

Comments: *Dendrobium chionanthum* is a very choice miniature for collectors of cool growing orchids. Delightful when in bloom, this species can have a multitude of snow-white flowers, held just above the shiny green leaves on the long ovary. Good air movement is needed to prevent *Botrytis* from spotting the beautiful flowers. A former member of the genus *Cadetia*, this group of almost entirely small to miniature plants is highly collectible, though only a limited number of species is available in the trade. *Dendrobium chionanthum* often has only a few flowers open at a time, but may bloom more heavily between early autumn and later winter.



Figure 4.471 (above) The pristine white flowers of *Dendrobium chionanthum*, an attractive miniature from New Guinea (Grower: Marni Turkel).

DENDROBIUM

Dendrobium funiforme Blume

Publication: *Rumphia* 4: 40 (1849)

Etymology: From the Latin *funis* (string) and the suffix *-formis* (shape, appearance), possibly a reference to the often narrow pseudobulbs.

Homotypic synonyms: *Cadetia funiformis* (Blume) Schltr., *Callista funiformis* (Blume) Kuntze, *Sarcocadetia funiformis* (Blume) M.A.Clem. & D.L.Jones.

Heterotypic synonyms: *Cadetia wariana* Schltr., *Dendrobium wariatum* (Schltr.) J.J.Sm., *Sarcocadetia wariana* (Schltr.) M.A.Clem. & D.L.Jone.

Morphology: Plant to 3 cm tall (individual growths), creeping to sometimes pendent, much branched, mat-forming, pseudobulbs densely clustered, alternating along rhizome. *Pseudobulb* 0.5–1.5 cm long by 2–5 mm wide, narrowly ovoid to subcylindric to fusiform, obliquely erect, ventrally channelled, leaf apical, unifoliate. *Leaf* 0.8–1.5 cm long by 2.5–5 mm wide, shortly petiolate, ovate, apex obtuse to acute, apiculate, lamina leathery, thickly fleshy, semi-glossy, rugulose. *Inflorescence* a raceme, peduncle 2–3 mm long, terminal. *Flower* 4–5 mm wide, single, resupinate, spreading, campanulate, pedicellate ovary to 4 mm long.

Range, elevation and habitat: . A rare species, *Dendrobium funiforme* grows in New Guinea, the islands of the Torres Strait, and in the McIlwraith Range on the Cape York Peninsula of northeast Queensland, Australia. It occurs at elevations of 200–800 m, growing as an epiphyte or lithophyte on rough-barked trees or rocks, often near watercourses, in humid rainforest and wet, lower montane forest, often on slopes. Plants may have some flowers at any time, with periodic flushes. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough barked hardwood, small rough wood shingles or tree fern, using New Zealand *Sphagnum* moss around the roots. Plants perform well on horizontal rafts. This species is not well suited to potted culture due to its creeping habit, though it is possible that shallow bulb pans may work well. *Temperature* warm to warm-intermediate. *Light* bright shade to medium shade. *Watering* keep moist and well drained, not wet, using the highest quality water possible, low in total dissolved solids. Plants can dry out briefly without harm. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly. If potted in moss, repot yearly.

Comments: *Dendrobium funiforme* is a wonderful, mat-forming species that thrives when grown on horizontal rafts. The blooms are quite small, but the white flowers with their bright yellow lips stand out nicely against the bright green of the succulent leaves and pseudobulbs. Many plants in cultivation are labelled with the old name, *Cadetia wariana*. Plants flower in all seasons, and it is not unusual for flowers to be present at any time.



Figure 4.472 (above) Pretty *Dendrobium funiforme* flowers nestle amongst the fleshy leaves (Grower: Hanging Gardens).



Figure 4.473 (above) The flowers and fleshy looking leaves of *Dendrobium funiforme* (Grower: Howard Gunn).

DENDROBIUM

Dendrobium quinquelobum (Schltr.) J.J.Sm.

Publication: *Bull. Jard. Bot. Buitenzorg*, II, 8: 18 (1912)

Etymology: From the Latin *quinque* (five) and *lobum* (lobe) referring to the flower.

Homotypic synonyms: *Cadetia quinqueloba* Schltr.

Morphology: *Plant* 7–10 cm tall, clumping, much branched, pseudobulbs densely clustered, rhizome gradually ascending. *Pseudobulb* 3.5–6 cm tall, occasionally longer, by 2 mm wide, narrowly cylindrical-elongate, leaf apical, unifoliate. *Leaf* to 3.5 cm long by up to 7 mm wide, sessile, somewhat conduplicate at base, shortly ligulate to narrowly oblong, apex rounded to obtuse, apiculate, lamina erect, leathery, rigid, glossy, rugulose, margins slightly recurved. *Inflorescence* a raceme, peduncle abbreviated, up to two simultaneous inflorescences, from fascicle at apex of pseudobulb, often both abaxially and adaxially. *Flower* 0.7–1 cm wide, single, resupinate, proportionately tiny recurved petals.

Range, elevation and habitat: *Dendrobium quinquelobum* grows epiphytically in cool, moist montane forest in the Bismarck Range of Papua New Guinea at elevations of 1500–2700 m. Conservation status unknown, but this species is likely to be secure.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. It may also be potted in small pots using moss or a fine bark mix. *Temperature* intermediate-cool to cool. Plants from higher elevations are best kept below 25 °C (78 °F) during the day, but may tolerate 10 °C (50 °F) or even a few degrees cooler at night. *Light* bright shade to medium shade. *Watering* keep moist and well drained, not wet. Use the highest quality water possible, low in total dissolved solids. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. This species resents disturbance, so ensure that plants have actively growing roots before dividing. Fertilise weekly at 1/4 strength. If potted in moss repot yearly.

Comments: *Dendrobium quinquelobum* has a most unusual flowering habit; it may bloom from either the front or the back of the leaf, and occasionally from both at the same time! It is unclear if the species illustrated is actually correctly named, as Schlechter did not mention this wonderful trait in his original description. Regardless, this is a select miniature orchid, and plants nearly always have some flowers present, though the major flush of blooms appears between mid-autumn to early spring.



Figure 4.474 (above) The flowers of *Dendrobium quinquelobum* may emerge from the front or back of the leaf (Grower: Cordelia Wong).



Figure 4.475 (above) *Dendrobium quinquelobum* is a floriferous species (Grower: John Leathers).

Group B

Species formerly in the genus *Dockrillia*

Profile: Considered by many, including the authors, to be a separate genus, this group contains over 45 species, the majority of which are found in eastern Australia, from northeast Queensland to eastern Tasmania. Other species occur in Indonesia, East Timor, New Caledonia, Fiji, Samoa, Tahiti, New Guinea and Vanuatu.

Comments: This group consists of epiphytic and lithophytic species from rainforests and humid areas of open forest.

General plant morphology: Creeping to pendent, lacking pseudobulbs. *Leaf* single, sessile, on a short stem, thickened, leathery, fleshy, generally round in cross-section. *Inflorescence* a raceme, one to many flowered, arising laterally from stem near to base of leaf. *Flower* non-resupinate, sepals and petals subsimilar, base of lateral sepals fused to column foot. Labellum narrow, hinged to apex of column foot, 3-lobed, ridged.



Figure 4.476 (above) A pair of handsome, nodding *Dendrobium striolatum* blooms. Though generally a small species, this taxon has both miniature and large forms (Grower: Ron Parsons).

DENDROBIUM

Dendrobium cucumerinum McLeay ex Lindl.

Publication: *Edwards's Bot. Reg.* 28(Misc.): 58 (1842)

Etymology: From the Latin *cucumerinus* (like a cucumber) referring to the appearance of the fleshy leaves.

Homotypic synonyms: *Callista cucumerina* (McLeay ex Lindl.) Kuntze, *Dockrillia cucumerina* (McLeay ex Lindl.) Brieger.

Morphology: *Plant* to 25 cm long or more, creeping, branching, mat-forming, sometimes in dense masses, growths spaced alternately 2–5 cm apart along rhizome. *Leaf* 2–5 cm long by 0.9–1.2 cm wide, sessile, stoutly to narrowly oblong, apex obtuse to rounded, lamina more or less prostrate to slightly ascending, straight to slightly curved, thick, terete, rarely erect, succulent, leathery, tuberculate with distinct bumps from softly prickly to nearly smooth, dark green. *Inflorescence* a raceme, 3–6.5 cm long, peduncle fairly short, slender, arising from base of leaf. *Flower* 1.2–2.5 cm long, 2–10 in number, rarely more, simultaneous, not spreading widely. Flowers vary from greenish to cream to yellowish, segments varying in amounts of purplish markings, flowers last 7–10 days, fragrant.

Range, elevation and habitat: *Dendrobium cucumerinum* is a widespread, locally common endemic of eastern Australia, from central New South Wales to south east Queensland, where it is found at elevations from sea level to 800 m. Although once quite common in New South Wales, *D. cucumerinum* has been extirpated in many areas, and is now more sparsely distributed. This species is often found in bright light, growing on trees in river valleys, and it seems to prefer inland areas with a greater temperature range. It can be found growing on the trunks and large horizontal branches of large River Oaks (*Casuarina cunninghamiana*) near water courses, and on the ridges and slopes of drier forest. *Dendrobium cucumerinum* occasionally grows with *D. linguiforme* Sw. and *D. bowmanii* Benth., and is only extremely rarely found on rocks. Plants usually bloom most heavily between late spring and mid-summer, but flowers may be seen into mid-autumn.

Culture recommendations: *Substrate* mount on cork bark or rough-barked hardwood horizontal rafts, using very little, if any, moss. Probably not well suited to tree fern. Baskets with a rough texture could be used, with little or no media, allowing the plant to grow on and around the basket. The rambling growth habit of this species is not suited to pot culture. *Temperature* it is difficult to categorise the temperature requirements for this species. Plants tolerate summer highs of 37 °C (100 °F) or more, but also winter lows to 0 °C (32 °F) or even slightly colder for brief periods. Perhaps the most important factor for successful growth of this species is a wide differential in day and night temperatures. Plants will do well with highs of 29 °C (85 °F) and lows of 10 °C (50 °F). *Watering* water, then allow to dry before watering again. Plants may be watered in winter, but less



Figure 4.477 (above) The pretty flowers of *Dendrobium cucumerinum* are faintly scented (Grower: Ron Parsons).



Figure 4.478 (above) *Dendrobium cucumerinum* flowers are borne on a fairly short peduncle (Grower: Ron Parsons).

DENDROBIUM

frequently. Plants that are mounted without moss should be watered more frequently as they dry out quickly. *Humidity* relatively high in the winter and spring to between average and low during the summer. *Air movement* good to brisk. *Propagation* division or seed. *Fertilise* at 1/4 to 1/2 strength weekly from early spring to early autumn, and at 1/4 strength every two weeks from early autumn to late winter.

Comments: Worth growing for the plant alone, *Dendrobium cucumerinum* is known as the Cucumber or Gherkin Orchid for its uniquely shaped, bumpy and warty leaves, true to its namesake. It is a favourite species of the authors, with its clusters of delightful, faintly fragrant flowers that stand just above the wonderful leaves. On a good sized plant, spikes are produced throughout the summer. If plants are not growing well and are on a vertical mount, reorientate the mount to a horizontal attitude.

Having observed how these plants grow in nature, often on the undersides of larger River Oak branches near streams (albeit only on the older trees), it was noted that plants growing on the River Oaks were larger, healthier and more robust than those usually seen in cultivation. After mimicking more closely the conditions observed in nature, it was surprising to note just how much better the plants performed. Until relatively recently, this species was named *Dockrillia cucumerina*. In nature, *Dendrobium cucumerinum* hybridises, albeit rarely, with both *D. bowmanii* and *D. linguiforme* where their ranges overlap.



Figure 4.479 (above) *Dendrobium cucumerinum* is so-named on account of its cucumber-like leaves (Grower: Ron Parsons).



Figure 4.480 (above) In nature, *Dendrobium cucumerinum* is usually found growing on the undersides of branches. Indeed, it seems to favour growing on inverted mounts even in cultivation (Grower: Ron Parsons).

DENDROBIUM

Dendrobium lichenastrum (F.Muell.) Rolfe

Publication: *Orchid Rev.* 13: 242 (1905)

Etymology: From *lichen* and the Latin suffix *-astrum* (a kind of) in reference to the prostrate, substrate-hugging plant habit.

Homotypic synonyms: *Bulbophyllum lichenastrum* F.Muell., *Phyllorkis lichenastrum* (F.Muell.) Kuntze, Brieger, *Dockrillia lichenastrum* (F.Muell.) Brieger, *Davejonesia lichenastra* (F.Muell.) M.A.Clem.

Morphology: *Plant* to 20 cm long or more, creeping, much branching, mat-forming, leaves alternately spaced, to 0.5 cm apart. *Leaf* 0.5–1.2 cm long by 0.5–0.7 cm wide, sessile, oval to orbicular, apex rounded to obtuse, lamina closely appressed to substrate, laterally flattened, thick, oblong in cross-section, succulent, rugose, punctate. *Inflorescence* a raceme, short, to 1 cm, lateral. *Flower* 0.4–0.7 cm long, single. Flower colour varies from pinkish to cream or white, with varying degrees of reddish striping.

Range, elevation and habitat: An Australian endemic, *Dendrobium lichenastrum* is found in northeastern Queensland where it grows at elevations of 200–1300 m. It is widespread and common, forming large mats on rocks, boulders, cliff faces and moss-covered branches in open forest and humid rainforests, particularly at elevations over 500 m. Flowering occurs in the spring, but occasional flowers may appear sporadically throughout the year.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern. This species is not suited to pot culture due to its prostrate rambling habit. *Temperature* warm to intermediate-cool, although best kept below 30 °C (85 °F) during the day, with a low of 13 °C (55 °F) at night. Plants may take substantially cooler temperatures at night, particularly if they are dry. *Light* bright diffuse to bright shade. *Watering* allow to dry briefly between waterings. Water should be reduced during winter, but not completely withheld. *Humidity* high. *Air movement* good. *Propagation* by division or seed. Feed at 1/4 to 1/2 strength weekly, except during winter when 1/4 strength every 2–3 weeks is sufficient.

Comments: *Dendrobium lichenastrum* is a charming miniature plant with rather attractive, substrate-hugging foliage. The thick, succulent, dimpled leaves lie nearly flat in alternate rows, and the rhizome branches freely, forming wonderful specimen plants. The exquisite flowers are proportionately sized and last 2–3 weeks, though they have an unusual, but faint, musty smell. Plants bloom most freely in spring, but flowers occur sporadically throughout the year in cultivation.

There is some debate as to whether *Dendrobium prenticei* (F. Mueller) Nicholls is a variety of *D. lichenastrum* or a species in its own right. Plants of the former are substantially larger, with nearly prostrate to almost erect leaves 2.5–4 cm long, and almost identical, but slightly larger flowers that may not be striped. Interestingly, the two taxa grow together in nature. Both have been placed in the genus *Davejonesia* in the recent past, but are a close morphological fit with the *Dockrillia* group with their succulent leaves, lack of pseudobulbs and non-resupinate flowers.



Figure 4.481 (above left) A *Dendrobium lichenastrum* flower (Grower: Howard Gunn).

Figure 4.482 (above right) The bloom of *Dendrobium lichenastrum* var. *prenticei* (Grower: Anna Chai).

Figure 4.483 (below left) The cute leaves and flowers of *Dendrobium lichenastrum* var. *lichenastrum* (Grower: Judy Carney).

Figure 4.484 (below right) A pair of *Dendrobium lichenastrum* var. *prenticei* blooms (Grower: Spiro Kasomenakis).

DENDROBIUM

Dendrobium linguiforme Sw.

Publication: Kongl. Vetensk. Acad. Nya Handl. 21: 247 (1800)

Etymology: From the Latin *linguae* (tongue) and *formae* (shape) referring to the shape of the leaves.

Homotypic synonyms: *Callista linguiformis* (Sw.) Kuntze, *Dockrillia linguiforme* (Sw.) Brieger.

Heterotypic synonym: *Dendrobium linguiforme* var. *huntianum* Rupp Brieger.

Morphology: Plant to 10 cm or more in length, creeping, much branched, mat-forming, growths to 2.5 cm apart, leaves arranged alternately, generally closely spaced. Leaf 1.5–4.5 cm long by 0.6–1.5 cm wide, sessile, oblong to obovate, apex obtuse to rounded, lamina laterally flattened, thick, basically oblong in cross-section, shallowly longitudinally furrowed, fairly smooth texture, succulent, leathery, often turning purplish in high light. Inflorescence generally a densely flowered raceme, 5–15 cm long (peduncle fairly short), suberect to descending, slender, lateral. Flower 1.3–3 cm long, to 20 in number, simultaneous, not spreading widely, slender segments, perianth segments acute, faintly fragrant.

Range, elevation and habitat: *Dendrobium linguiforme* grows in eastern Australia (coastal southeast New South Wales to northeast Queensland) in rainforest and open forest. It is found growing on tree trunks, cliff faces and large rock walls, but particularly sandstone, and grows in full sun to fairly dense shade in areas subject to high heat, frost and drought. This common species is found with many other epiphytic and lithophytic orchid species including *Dendrobium* (*Dockrillia*) *striolatum* Rchb.f., *Bulbophyllum shephardii*, and *Cymbidium suave* R.Br., as well as Elkhorn ferns (*Platycerium bifurcatum*).

Culture recommendations: Substrate mount on cork bark, rough-barked hardwood, rough wood shingles or tree fern with or without added moss. Plants are not suited to potted culture due to the prostrate rambling habit. Temperature intermediate to cool. Plants in nature regularly survive temperatures in excess of 38 °C (100 °F), as well as brief periods of hard frost, but cultivated plants do not require these extremes. Light bright conditions to medium shade. Watering plants may be watered freely during summer as long as plants are allowed to dry between waterings. Some watering is necessary during winter, although misting of the roots once per week should suffice. Humidity average, 50–60 %, slightly higher during spring, though not a requirement. Propagation by division or seed. This plant is particularly easy to propagate by divisions. Fertilise at 1/4 to 1/2 strength weekly, except during late autumn through winter, when 1/4 strength every 2–3 weeks is fine. When in bloom, keep flowers dry as they will persist for twice as long.



Figure 4.485 (above) A specimen of *Dendrobium linguiforme* in heavy bloom (Grower: John Leathers).



Figure 4.486 (above) *Dendrobium linguiforme* growing on rock in Watagans National Park, New South Wales.

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Comments: *Dendrobium linguiforme*, commonly known as the Tongue Orchid, is one of the most rewarding orchids to grow. The attractive plants have thick, succulent, flattened, ribbed leaves and, when in bloom in late winter to early spring, may be entirely obscured by the show of flowers. Excellent for beginners and advanced growers alike, the plants are extremely adaptable, and can withstand extremes of 0 °C (32 °F) to 38 °C (100 °F) without difficulty. The plants are spectacular when large and covered with blooms, but start to flower when fairly young. They may be grown in bright light as well as in quite shady conditions. The pure white, lacy flowers will last up to three weeks when kept dry, but are much shorter lived if allowed to get wet.

A variety seen in some Australian collections bears the name var. *huntianum*; the flowers of this now unrecognised form are similar to those of the close relative, *D. nugentii*. Its leaves are close in appearance to the nominate variety, but quite narrow and elongate. *Dendrobium linguiforme* var. *linguiforme* hybridises naturally with *D. teretifolium* R.Br., *D. pugioniforme* A.Cunn. ex Lindl. and *D. cucumerinum*.

As mentioned, *Dendrobium nugentii* F.M.Bailey is likely the closest relative to *D. linguiforme*. It occurs in northeast Queensland and south to the base of the Cape York Peninsula, as well as in New Guinea at 40–1000 m elevation, typically in drier situations than *D. linguiforme*. Several consistent features differentiate *D. nugentii* from that species. The general plant habit is quite similar between the two taxa, but the leaves of *D. nugentii* are thicker, often broader and, unlike those of *D. linguiforme*, are rough-textured. The flowers of *D. nugentii* differ in their smaller size, often creamy colouration, and shorter segments with less pointed tips. The culture conditions required by both taxa are the same, though *D. nugentii* can tolerate much drier conditions. Moreover, even though it comes from warmer climes, it can withstand cold conditions like its relative. Both species bloom at similar times, usually in the early spring.



Figure 4.487 (above) Numerous flowering plants of *Dendrobium linguiforme* growing epiphytically on the limb of a large tree in Tinonee, New South Wales.

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Dendrobium nugentii hybridises naturally with *D. racemosum* (Nicholls) Clemesha & Dockrill and *D. teretifolium* var. *fasciculatum* Rupp (*Dockrillia calamiformis*), the latter hybrid was formally named *D. × grimesii* (C.T.White & Summerh.) Rauschert.



Figure 4.488 (above) The elegant flowers of *Dendrobium nugentii* (Grower: Ron Parsons).

Figure 4.489 (facing page) A trio of *Dendrobium rigidum* blooms with more delicate colouration (Grower: Mary Gerritsen).



DENDROBIUM

Dendrobium rigidum R.Br.

Publication: *Prodr. Fl. Nov. Holl.*: 333 (1810)

Etymology: From the Latin *rigidus* (stiff, hard), referring to the leaves.

Homotypic synonyms: *Callista rigida* (R.Br.) Kuntze, *Dockrillia rigida* (R.Br.) Rauschert.

Heterotypic synonyms: *Dendrobium desmotrichoides* J.J.Sm., *Dockrillia desmotrichoides* (J.J.Sm.) Brieger.

Morphology: Plant to 10 cm long, freely branching, creeping to pendent, leaves close set to 3 cm apart, rooting at base, but with occasional aerial roots. Leaf 1–6 cm long by 0.7–1.5 cm wide, sessile, lingulate to oblong to ovate, apex obtuse to acute, apiculate, lamina erect to suberect, slightly curving to side, laterally flattened, thick, basically oblong in cross-section, stiff, leathery, rugose, dark green, sometimes spotted with purple. Inflorescence a raceme, 1–5 cm long, flowers congested towards apex, erect to ascending, slender, lateral. Flower 0.8–1.5 cm wide, 2–7 in number, simultaneous, campanulate to spreading widely. Flowers vary from whitish cream to cream to yellowish, occasionally pinkish, and in the amount of red overlay on the cream to pale yellow lip. The lip may be entirely yellow.

Range, elevation and habitat: *Dendrobium rigidum* occurs in far northeastern Australia (east Cape York, Queensland), the Torres Strait islands and New Guinea. This common and relatively widespread species grows as an epiphyte, occasionally as a lithophyte, in mangrove, coastal rainforest, paperbark swamp, dry sclerophyll forest, and on ironbark trees and rock faces in low mountains and dry savannahs near watercourses. It is found from sea level to 800 m. It often grows with *Dendrobium discolor* Lindl, *D. johannis* Rehb.f, *D. teretifolium* var. *fasciculatum* Rupp and *D. canaliculatum* R.Br. *Dendrobium rigidum* has a main flush of flowers in the spring, but blooms sporadically throughout the year.

Culture recommendations: Substrate mount on cork bark, rough-barked hardwood, rough wood shingles and tree fern (preferably without moss). This species is not well suited to potted culture as the roots should not stay wet. Remounting is best done in the spring. Temperature warm to intermediate. Light bright diffuse to bright shade. Watering Allow to dry briefly, but completely, between waterings. Plants should be kept much drier during winter, with occasional misting. Humidity relatively high, 70–75 %. Air movement good to brisk. Propagation by division or seed. When dividing, make sure divisions have roots. Fertilise at 1/4 to 1/2 strength weekly.

Comments: Although *Dendrobium rigidum* has smallish flowers, they are probably the most colourful of the group formerly known as *Dockrillia*. The petals and sepals are cream-coloured or occasionally pinkish, with striking lips that may have wide, bright red margins or be entirely yellow. It seems as if no two plants have identical flowers. The plants are slightly reminiscent of *D. lingueforme*, but the leaves of *D. rigidum* are lighter in colour, rugose, lack ribbing and are apiculate, while the plants tend to root at the base instead of along the rhizome. The flowers last 10–14 days, but as in nature, may occur at any time of year in cultivation. Where the range of *D. rigidum* overlaps with *D. teretifolium* var. *fasciculatum* (formerly *Dockrillia calamiformis*), a rare natural hybrid of the two occurs. This has been formally described as *D. × foedaratum* St. Cloud.

Figure 4.490 (facing page, above left) A quartet of bold *Dendrobium rigidum* flowers (Grower: White Oak Orchids).

Figure 4.491 (facing page, above right) Blooms of *Dendrobium rigidum* are borne from a congested inflorescence (Grower: White Oak Orchids).

Figure 4.492 (facing page, below left) A predominantly white flowered variety of *Dendrobium rigidum* (Grower: Mike Harrison).

Figure 4.493 (facing page, below right) A pair of *Dendrobium rigidum* blooms with more delicate colouration (Grower: Canberra Botanic Gardens).



DENDROBIUM

Dendrobium toressae (F.M.Bailey) Dockrill

Publication: *Orchadian* 1: 64 (1964)

Etymology: Named for Ms. Toressa Meston, wife of the original collector of the species, Mr. A. Meston.

Homotypic synonyms: *Bulbophyllum toressae* F.M.Bailey, *Stilbophyllum toressae* (F.M.Bailey) D.L. Jones & M.A. Clem, *Dockrillia toressae* (F.M.Bailey) Brieger.

Morphology: *Plant* to 8 cm long, creeping, much branching, mat-forming, leaves arranged alternately along rhizome, closely set. *Leaf* 0.4–0.8 cm long by 0.2–0.4 cm wide, sessile, oblong, apex acute, apiculate, lamina prostrate to slightly ascending, v-shaped channel on upper surface, semi-terete, pustulose, glossy dark green, becoming purplish to reddish in high light. *Inflorescence* a raceme, extremely abbreviated, stout, lateral. *Flower* 0.3–0.5 cm long, single, spreading, campanulate, proportionately huge. Flowers are cream to yellowish in colour, often with faint reddish suffusion.

Range, elevation and habitat: *Dendrobium toressae* is found in eastern Australia (eastern side of Cape York Peninsula, Queensland), where it grows epiphytically, rarely lithophytically, on trees and rocks in rainforest, on shady rock and rocky outcrops in wet sclerophyll forest, and in the ranges and tablelands, often in exposed situations in usually humid conditions. It occurs at elevations ranging from 50–1220 m and is locally common. Plants flower throughout the year with a flush in the winter.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern. It may do better hung horizontally. Not suited to pot culture. *Temperature* intermediate, cooler during the winter, with lows of 10 °C (50 °F). *Light* bright diffuse. *Watering* Allow to dry before watering again. Plants should not stay wet. Keep slightly drier during the winter. *Humidity* moderately high (65–75 %). *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, less during winter.

Comments: Even among growers of miniature orchids, there are those that love the extreme micro-mini species. *Dendrobium toressae* is perfect for such a passion. A plant with hundreds of leaves can easily fit on a 15 x 15 cm (6 x 6 in.) mount, and close examination reveals glossy, rice grain-sized, warty leaves that seem to sparkle from all angles. The cute, proportionately huge flowers appear to rest upon the leaves. They are slightly disproportionate, with a small dorsal sepal and petals, but large lateral sepals, lip and mentum. Plants often seem to have flowers, and it is not unusual for them to be in bloom for much of the year. Some people find this species difficult to grow, and to succeed, one must make sure that plants get sufficient good quality water, dry completely between waterings, and are not over-fertilised.



Figure 4.494 (above) The diminutive leaves and flowers of *Dendrobium toressae* (Grower: Eric Holanda).



Figure 4.495 (above) The flower of *Dendrobium toressae* in detail (Grower: Howard Gunn).

Group C

Species formerly in the genus *Diplocaulobium*

Profile: This group, formerly classified in the genus *Diplocaulobium*, is comprised of just over 100 epiphytic, occasionally lithophytic, species occurring in the rainforests and open humid forests of the Philippines, Malaysia, Indonesia, New Guinea, Australia and Polynesia. As a genetically and morphologically cohesive group, they share the following characteristics.

General plant morphology: Clumping, slowly creeping, rhizome sometimes ascending. *Pseudobulbs* clustered, to spaced a short distance apart along the rhizome, often swollen at the base and narrowed apically, leaf apical, unifoliate. *Leaf* sessile, apex unequally notched. *Inflorescence* a single-flowered raceme, one to two simultaneous inflorescences, each meristem producing a number of flowers over time, terminal from apex of pseudobulb within a papery bract. *Flowers* spreading widely, often star-shaped, segments often long, narrow, attenuated, thin-textured, base of lateral sepals widened and joined to column foot, petals free, lip 3-lobed, hinged to apex of column foot, flowers short lived.



Figure 4.496 (above) This unidentified *Diplocaulobium* group *Dendrobium* species is rather typical of many in the group (Grower: White Oak Orchids).

DENDROBIUM***Dendrobium chrysotropis* Schltr.****Publication:** *Fl. Schutzgeb. Südsee, Nachtr.*: 159 (1905)**Etymology:** From the Greek *chryso* (golden) and *tropis* (keel).**Homotypic synonym:** *Diplocaulobium chrysotropis* (Schltr.) A.D.Hawkes.

Morphology: *Plant* individual growths to 7 cm tall, creeping, much branching, somewhat mat-forming, rhizome ascending, pseudobulbs spaced to 1 cm apart along rhizome. *Pseudobulb* to 2.8 cm tall by 0.7 cm wide, quadrate to many angled, narrowly ovoid in profile, suberect to nearly prostrate, enclosed in papery bracts, unifoliate. *Leaf* to 5.5 cm long by 1 cm wide, ligulate to oblong-ligulate to narrowly ovate, tapering at base, apex obtuse, apiculate, bilobed, lamina erect to spreading, leathery, rigid, slightly glossy. *Inflorescence* a raceme, one to two single-flowered simultaneous inflorescences, peduncle less than 1 cm long, slender, borne from sheath at apex of pseudobulb. *Flower* 2.5–4 cm in diameter, proportionately large, single, resupinate, widely spreading, pedicellate ovary to 5 cm long.

Range, elevation and habitat: *Dendrobium chrysotropis* grows as an epiphyte on tall trees, often with mosses, in montane cloud and mist forest in Papua New Guinea at elevations of 1000–1300 m. Plants may flower at any time, and do so several times a year. Conservation status unknown, but this species is likely to be secure.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern plaques, using New Zealand *Sphagnum* moss around the roots. Although small plants may be potted, this species is not really suited to potted culture due to the ascending, creeping, branching rhizome. If intending to grow plants to specimen size, ensure that mount is of sufficient size to support the expanding plant. Some growers find that it may grow off the mount and still do well with just a small area attached. *Temperature* intermediate to intermediate-cool. Although from middling elevations, plants in some collections easily take to 13 °C (55 °F) at night regularly, and will tolerate a few degrees colder. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet; plants are not harmed by drying slightly between waterings. Use high quality water. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: Although currently classified as a *Dendrobium*, many feel that this species, as well as *D. obyrnei* and *D. stelliferum*, should still be placed within *Diplocaulobium*; if thus classified, *Dendrobium chrysotropis* would belong within section *Goniobulbon* of that genus. This species is closely related to *D. stelliferum*, and there are numerous forms or very similar species that are taxonomically confused, so much so that it is with some hesitation that the authors use this name. Whatever the case, this taxon

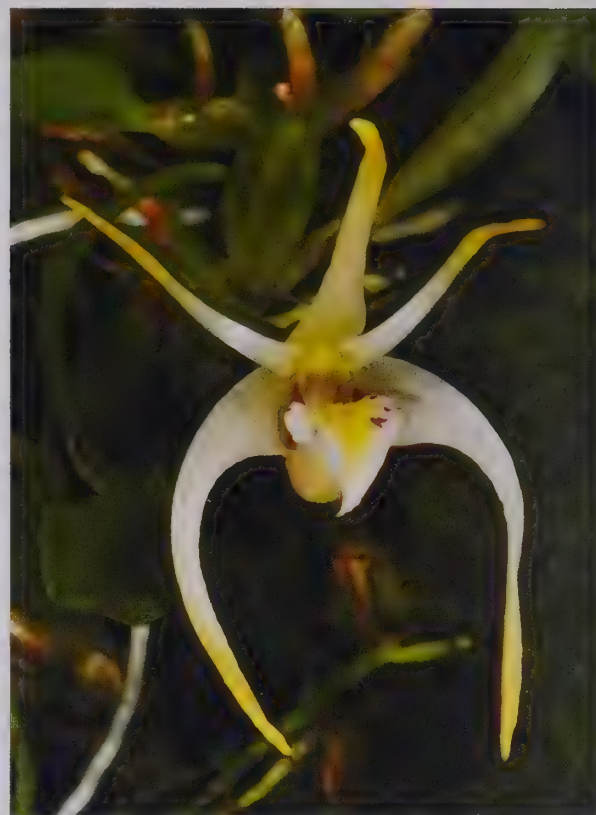


Figure 4.497 (above) The relatively large flower of *Dendrobium chrysotropis* (Grower: Marni Turkel).



Figure 4.498 (above) The bloom of *Dendrobium chrysotropis* is often ornately coloured (Grower: Marni Turkel).

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is a wonderful miniature, with proportionately large and showy flowers that last 2–4 days, much longer than many of the other species in this *Dendrobium* group. This species, as with *D. obyrnei* and *D. stelliferum*, should be grown on mounts due to its rambling, branching and ascending habit. As in nature, the flowers may appear at any time of year, but usually between mid-spring and mid-autumn.



Figure 4.499 (above) The beautiful flower of *Dendrobium chrysotropis*, a native of New Guinea (Grower: Marni Turkel).



Figure 4.500 (above) *Dendrobium ridleyanum* Schltr. is closely related to *D. chrysotropis*, but easily distinguished by a lack of spots on the lip. (Grower: Judy Carney).

DENDROBIUM

Dendrobium obyrnei (W.K.Harris) Schuit. & de Vogel

Publication: *Malesian Orchid J.* 4: 104 (2009)

Etymology: Named in honour of orchid authority Peter O'Byrne, of the United World College of S.E. Asia, Singapore, author of *Lowland Orchids of Papua New Guinea* and other orchid related books and papers, who recognised the species as new.

Homotypic synonym: *Diplocaulobium obyrnei* W.K.Harris.

Morphology: Plant to 10 cm, creeping, erect, rhizome semi-ascending, mat-forming, much branching, pseudobulbs initially clustered, but spaced as plants mature. *Pseudobulb* 2–4 cm tall by 0.4–0.5 cm wide, narrowly conical to fusiform, unifoliate. *Leaf* 5.5–11 cm long by 0.5 cm wide, petiolate, ligulate, apex acute, unequally bilobed, lamina usually arcuate, erect to slightly spreading, semi-rigid, leathery, prominently channelled. *Inflorescence* a raceme, peduncle 2 cm long, one to two simultaneous inflorescences, erect, borne terminally at irregular intervals at apex of pseudobulb from dry sheaths. *Flower* to 2.5 cm in diameter, one open at a time, blooming successively, resupinate, widely spreading, pedicellate ovary to 5.5 cm, large mentum, flowers ephemeral, lasting 1 day.

Range, elevation and habitat: A species from eastern Papua New Guinea and adjoining islands, *Diplocaulobium obyrnei* occurs at low elevations in seasonally dry forest near water, and in lowland rainforest, at 30–300 m. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern plaques, using some New Zealand *Sphagnum* moss around the roots. Although small plants may be potted, this species is not well suited to potted culture due to the ascending rhizome. If intending to grow plants to specimen size, ensure the mount is of sufficient size to support the growing plant. *Temperature* warm. *Light* bright shade to medium shade. *Watering* best to keep moist, well drained, not wet, but may be allowed to dry briefly without harm; it is best to give plants a dry period when pseudobulbs mature, misting roots occasionally. Use high quality water. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: The flowers of *Dendrobium obyrnei* are stunning, but unfortunately fleeting, lasting just one day. A good sized plant can nevertheless produce flowers for several days and bloom at any time of year. It is thought that the ephemeral flowers appear in response to a sudden temperature drop due to changes in weather. This species is quite common in Australian orchid collections and possibly elsewhere, but the authors have not seen it in the United States. When this species was classified as *Diplocaulobium*, it was placed in section *Diplocaulobium*.



Figure 4.501 (above) The wonderful, brightly coloured flowers of *Dendrobium obyrnei* (Grower: Orchid Species Plus).



Figure 4.502 (above) The striking blooms of *Dendrobium obyrnei* last for just one day (Grower: Orchid Species Plus).

DENDROBIUM

Dendrobium stelliferum J.J.Sm.

Publication: *Nova Guinea* 14: 399 (1929)

Etymology: From the Latin *stella* (star) and *ferum* (bearing), referring to the shape of the flower.

Homotypic synonyms: *Diplocaulobium stelliferum* (J.J.Sm.) A.D.Hawkes.

Morphology: *Plant* individual growths to 5 cm tall, creeping, much branching, mat-forming, rhizome ascending, pseudobulbs spaced to 1.5 cm apart along rhizome. *Pseudobulb* 1–2.5 cm tall by 0.5–0.7 cm wide, unequally six sided, narrowly conical, sides concave between ridges, tapering towards apex, suberect to nearly prostrate, unifoliate. *Leaf* to 5 cm long by up to 1.3 cm wide, shortly petiolate, lanceolate to narrowly lanceolate, apex obtuse, lamina erect to spreading, rigid, fleshy, leathery, pale underneath. *Inflorescence* a raceme, one to two single-flowered simultaneous inflorescences, peduncle less than 1 cm long, erect to suberect, borne terminally from apex of pseudobulb. Flower 2.5–4 cm wide, single, resupinate, spreading widely, pedicillate ovary to 3–4 cm, relatively short lived. This is a variable species with numerous forms. It may belong to a species complex, that is, a group of closely related and taxonomically confused species.

Range, elevation and habitat: A tropical lowland wet forest species found in coastal forests and swamps, *Dendrobium stelliferum* occurs in New Guinea. Plants may bloom at any time of the year, and usually several times per year. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern plaques, using some New Zealand *Sphagnum* moss around the roots. Small plants may be potted, but this species is not well suited to potted culture due to its ascending rhizome. If growing plants to specimen size, ensure the mount is of sufficient size to support the growing plant. If it grows off the mount, it will still do well with just a small area attached. *Temperature* warm. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet; plants are not harmed by drying slightly between waterings. Use high quality water. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: Another former *Diplocaulobium*, this species is closely related to *Dendrobium chrysotropis*. Like the latter, if placed in that genus it would belong to section Goniobulbon, a group with multi-angular pseudobulbs. Most of the species formerly classified as *Diplocaulobium* have ephemeral flowers, lasting anywhere from a few hours to one day, but *D. stelliferum* has blooms that usually last 2–3 days. All the former *Diplocaulobium* species may bloom several times per year. As stated above, *D. stelliferum* belongs to a group of closely related, but taxonomically confused species, and as with *D. chrysotropis*, the authors cannot guarantee the identity of the flowers illustrated. Regardless, these plants are highly rewarding to grow, particularly when they reach specimen size, with their intermittent mass blooms of proportionately large, starry flowers.



Figure 4.503 (above) The proportionately large bloom of *Dendrobium stelliferum* may last for up to three days, making it long-lived for the group (Grower: Ray Clement).

Group D

Species formerly in the genus *Epigeneium*

Profile: Viewed by many as a distinct genus, but recently transferred back into *Dendrobium*, this group includes over 50 epiphytic and lithophytic species from tropical Asia.

General plant morphology: Plants small to large, sympodial, creeping, pseudobulbs clustered to spaced to 10 cm apart. *Pseudobulbs* ovoid, often angular, enclosed by papery sheaths at maturity, leaves apical, unifoliate or bifoliate. *Leaf* elliptical to oblong, sessile or shortly petiolate, minutely lobed at apex, somewhat fleshy, leathery. *Inflorescence* a raceme, often pendent, terminal from apex of pseudobulbs. *Flowers* 1–20, simultaneous, sepals and petals subsimilar in size, petals usually slightly narrower than sepals, lip 3-lobed, mid-lobe often broader than long, slightly reflexed, column short, often slightly curved, pollinia 2 or 4, in pairs, with no stipe or caudicle.



Figure 4.504 (above) The handsome, caramel-coloured flower of *Dendrobium brunneum* is proportionately large (Grower: Cindy Hill).

DENDROBIUM

Dendrobium brunneum Schuit. & Peter B.Adams

Publication: *Muelleria* 29: 65 (2011)

Etymology: From the Latin *brunneum* (brown), referring to the flowers.

Homotypic synonyms: *Epigeneium chapaense* Gagnep., *Sarcopodium chapaense* (Gagnep.) Tang & F.T.Wang.

Morphology: *Plant* individual growths to 6.5 cm, creeping to pendent, much branching, mat-forming, pseudobulbs spaced to 0.5 cm apart along rhizome. *Pseudobulb* to 2 cm long by 0.8 cm wide, angular, often tetragonal, enclosed in papery sheaths, reclining with upturned apex, leaf apical, unifoliate. *Leaf* to 5.5 cm long by 1.5 cm wide, oblong-elliptic to obovate, apex rounded to obtuse, slightly unequally bilobed, lamina suberect to spreading, leathery, rigid, minutely marginate, slightly rugose, dark green above, reddish or light green on underside. *Inflorescence* a raceme, peduncle short, slender, ascending, horizontal or descending, borne apically. *Flower* 2.5 cm long, single, resupinate, slightly spreading, petals large and recurved, prominent mentum, lax pedicellate ovary to 2.8 cm.

Range, elevation and habitat: *Dendrobium brunneum* is endemic to Vietnam at elevations of 600–2200 m, where it grows as an epiphyte or lithophyte, often growing in trees in humid mixed forest, coniferous forest, and highland cloud forest. At higher elevations, plants are subjected to quite cold conditions. In nature, plants bloom in May to June. It is particularly abundant in the north.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not suited to culture in small pots, but does well in bulb pots or even bonsai pots in a fine bark mix. *Temperature* intermediate to cool. *Light* bright shade. *Water* keep moist, well drained, not wet, but plants are not harmed by brief dry periods. *Air movement* good to brisk. *Propagation* easy by division or seed. *Fertilise* at 1/4 strength weekly, reducing the frequency and strength during winter.

Comments: This species was recently renamed *Dendrobium brunneum*, but the vast majority of plants are likely to be labelled as *Epigeneium chapaense*. A wonderful little plant to cultivate, it grows relatively quickly, branches frequently, and makes a lovely specimen. The plant is quite attractive, with angular pseudobulbs enclosed in long-lasting, reddish, papery bracts topped by a dark-green, semi-glossy, leathery leaf. The proportionately large flower is caramel coloured, and dangles from the apex of the pseudobulb, looking rather frog-like. The flowers last approximately two weeks, and tend to appear during the autumn.



Figure 4.505 (above) Flowers of *Dendrobium brunneum* may persist for two weeks (Grower: White Oak Orchids).



Figure 4.506 (above) *Dendrobium brunneum* photographed in Son La, North Vietnam (Photo: Leonid Averyanov).

DENDROBIUM

Dendrobium fargesii Finet

Publication: *Bull. Soc. Bot. France* 50: 374 (1903)

Etymology: Named for Paul Farges (1844–1922), English missionary and plant collector in China.

Homotypic synonyms: *Desmotrichum fargesii* (Finet) Kraenzl, *Epigeneium fargesii* (Finet) Gagnep., *Sarcopodium fargesii* (Finet) Tang & F.T. Wang.

Morphology: *Plant* individual growths to 5 cm tall, creeping, much branching, mat-forming, pseudobulbs closely set, new growth emerging from near the apex of old pseudobulb. *Pseudobulb* to 2.5 cm long by up to 1 cm wide, ovoid, multi-angled, enclosed in papery sheaths, reclining with apex suberect, leaf born at apex of pseudobulb, unifoliate. *Leaf* to 3 cm long by 1 cm wide, shortly petiolate, oblong, apex obtuse to rounded, minutely bilobed, lamina suberect to spreading, rigid, dark green above, glossy. *Inflorescence* a raceme, 2.5–3 cm long on short peduncle (including pedicellate ovary), suberect, slender, borne apically from recently matured pseudobulbs. *Flower* to 3.5 cm long, single, resupinate, spreading to spreading widely, proportionately huge mentum.

Range, elevation and habitat: *Dendrobium fargesii* is widespread and occurs in Taiwan, China (south Anhui, Fujian, Guangdong, Guangxi, Hubei, Hunan, Jiangxi, Sichuan, central and southeast Yunnan, and south and southeast Zhejiang provinces), Bhutan, Northeast India and Thailand. It grows as an epiphyte on tree trunks and as a lithophyte on rocks in montane forest at elevations ranging from 800–2500 m. In Thailand, where it is rather rare, it occurs at elevations of 800–2000 m. Flowers vary somewhat in shape, and in colour from white to pink, but always with rose-red streaks on the reverse. *Dendrobium fargesii* flowers from April to May in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern. This species is not suited to pot culture due to its branching habit and ascending rhizome. *Temperature* intermediate to cool. *Light* bright diffuse to bright shade. *Watering* keep moist, well-drained, not wet, but reduce water as pseudobulbs mature, or in autumn, and allow to dry completely between waterings during winter, misting roots 2–3 times per week. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, reducing the frequency and strength during winter.

Comments: A delightful little plant, much beloved of the authors, *Dendrobium fargesii* was one of the species that inspired this publication. For many years incorrectly sold under the name *Epigeneium sanseense* (in fact a synonym of a related species, *D. nakaharae*), *D. fargesii* is not commonly seen in collections, though it deserves to be. The appealing, but unusually shaped flowers vary in colour from white to pink, and have a beautiful,



Figure 4.507 (above) The unusually shaped and beautiful flower of *Dendrobium fargesii* (Grower: Ron Parsons).



Figure 4.508 (above) A predominantly pinkish *Dendrobium fargesii* flower (Grower: Cindy Hill).

DENDROBIUM

streaky, rose-red colouration on the posterior side. The flowers hang from a fairly short, weak pedicel at the apex of the pseudobulb; remarkably, they are larger than both the pseudobulbs and the leaves put together. An intriguing feature is the unusually large mentum that juts downward like an oversized chin. The plants bloom reliably between late spring and mid-summer in cultivation, and a specimen in full bloom is not easily forgotten.



Figure 4.509 (above) A mounted specimen plant of *Dendrobium fargesii*. The dark leaves and bright, appealingly coloured flowers that sprout like fantastically shaped candles from amongst the foliage make this one of the firm favourites of the authors (Grower: Ron Parsons).

Figure 4.510 (following page) A trio of *Dendrobium fargesii* flowers in detail. This taxon blooms reliably from late spring into the summer (Grower: Ron Parsons).



DENDROBIUM

Dendrobium nakaharae Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 2: 169 (1906)

Etymology: Named after Y. Nakahara, who collected the species.

Homotypic synonym: *Epigeneium nakaharae* (Schltr.) Summerh.

Heterotypic synonyms: *Dendrobium sanseense* Hayata, *Epigeneium sanseense* (Hayata) Summerh.

Morphology: Plant individual growths to 6.5 cm tall, creeping, much branched, mat-forming, pseudobulbs closely spaced, new growths emerging from near apex of previous pseudobulb. *Pseudobulb* 2.5–3.5 cm long by up to 1 cm wide, obliquely fusiform to unevenly elliptic, many angled, enclosed in papery sheaths, reclining with apex erect, leaves borne at apex of pseudobulb, unifoliate. *Leaf* 2–5 cm long by 1–1.8 cm wide, elliptic to oblong-ovate, apex obtuse to rounded, lamina erect to spreading, leathery, rigid, marginate. *Inflorescence* a raceme, 1.8–4.2 cm long (including the pedicellate ovary), borne apically from sheath on newest growths. *Flower* 2.5–3.5 cm in diameter, single, resupinate, widely spreading, thick textured, labellum waxy and shiny, faintly fragrant.

Range, elevation and habitat: Endemic to Taiwan, *Dendrobium nakaharae* is a locally common epiphyte that grows on the trunks and large limbs of trees in moist, semi-shady, montane, broadleaf forest at elevations of 700–2400 m. This species blooms from October to February in nature.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern. This species is not suited to pot culture due to the much branching habit and ascending rhizome. *Temperature* intermediate to cool. *Light* bright diffuse to bright shade. *Watering* keep moist, well-drained, not wet, but reduce water as pseudobulbs mature, or in the autumn. Plants should dry completely between waterings in winter, when misting roots 2–3 times per week is sufficient. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, reducing frequency and strength in winter.

Comments: *Dendrobium nakaharae* is closely related to the other former *Epigeneium*, *D. brunneum* and *fargesii*, and is quite similar in both plant form and habit. Most plants in cultivation are labelled *Epigeneium nakaharae*, although the specific epithet is often misspelled *nakaharai* or *nakaharaei*. It is the mostly commonly grown of the three species, and its culture is relatively easy in a glasshouse collection. The petals and sepals are yellowish to light brown, while the contrasting, somewhat squarish lip is darker, shiny and waxy. Held erect, the lovely flowers have an elegant stance. Although not brightly coloured, this remains a popular species in cultivation. It blooms in the autumn to early winter, although spring blooms occasionally occur.



Figure 4.511 (above) The flower of *Dendrobium nakaharae*, an easily grown species (Grower: Allison Lehman).



Figure 4.512 (above) The elegant bloom of *Dendrobium nakaharae* is apically borne (Grower: Marni Turkel).

Dendrochilum Blume

Publication: Blume, K. L. von, 1825, *Bijdr.*: 398

Subfamily: Epidendroideae

Tribe: Coelogyneae

Subtribe: Coelogyninae

Type species: *Dendrochilum abbreviatum* Blume, 1825, *Bijdr.*: 400.

Etymology: From the Greek *dendros* (tree) and *cheilos* (lip), but what this refers to unclear.

Heterotypic synonyms: *Acoridium* Nees & Meyen, *Platyclinis* Benth., *Basigyne* J.J.Sm., *Pseudacordium* Ames.

Profile: A genus of more than 250 epiphytic, lithophytic and, more rarely, terrestrial species widespread in tropical southeast Asia, with centres of diversity in Borneo and the Philippines. Many new species are still being described.

General plant morphology: Tiny to large, sympodial, pseudobulbs clustered or spaced along rhizome. *Pseudobulb* usually present, small to medium sized, some nearly obsolete, narrowly cylindrical to ovoid, subtended by or sometimes obscured by basal papery bracts, leaf apical, unifoliate. *Leaf* generally petiolate, linear to oblong, sometimes even grasslike, leathery. *Inflorescence* a densely flowered raceme, erect to downward arching, flowers subtended by bracts, usually distichous, usually borne from centre of new growth (synanthous), a few species forming a separate blooming growth (heteranthous). *Flower* tiny to small, usually many in number, two-ranked, campanulate to widely spreading, lateral sepals joined to base of column, petals subsimilar, either simple or trilobed, lip firmly to elastically attached, fleshy at base, column winged at apex, pollinia 4, usually fragrant to odoriferous. Many species have both small and large plant forms.



Figure 4.513 (above) A magnificent display of *Dendrochilum pulcherrimum* plants in full flower (Grower: Cindy Hill).

DENDROCHILUM

Dendrochilum auriculare Ames

Publication: *Philipp. J. Sci.*, C 4: 595 (1909)

Etymology: From the Latin *auriculatus* (eared), with reference to the ear-like side-lobes of the lip.

Homotypic synonym: *Acoridium auriculare* (Ames) Ames.

Morphology: *Plant* to 14.5 cm tall, clumping, branching, creeping, clustered, roots thin and orange tipped. *Pseudobulb* to 2.5 cm tall by 0.8 cm wide, narrowly conical to conical-ovoid, rugulose, blackish green. *Leaf* to 12 cm long by 3 cm wide, petiolate (to 3 cm), oblong-lanceolate to ovate-lanceolate, apex obtuse to rounded, apiculate, lamina leathery, flexible, dark green, somewhat shiny, margins whitish-green, new foliage bronze-green. *Inflorescence* a raceme, to 10 cm long, arching, generally descending, slender, sparsely and minutely papillose, flowers distichous, arising from centre of emerging new growth (synanthous). *Flower* 0.7–0.8 cm long, to 30 in number, simultaneous, resupinate, spreading widely.

Range, elevation and habitat: An uncommon to rare species endemic to the Philippines, *Dendrochilum auriculare* is found on the island of Luzon in the provinces of Benguet, Ifugao, Nueva Viscaya, Quezon, and Rizal. It grows at elevations of 1500–2500 m as an epiphyte low on trees, generally amongst mosses, in moist, evergreen montane forest. Plants bloom between September and February.

Culture recommendations: *Substrate* pot in New Zealand *Sphagnum* moss or a fine bark mix. This species may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of moss around the roots. *Temperature* intermediate to cool. This species has been grown outside in a shade house in the vicinity of Sydney, Australia, where it regularly tolerates to near-freezing temperatures in winter if plants are dry. Even so, night temperatures are best kept above 10 °C (50 °F). *Light* bright shade. *Watering* keep moist, well drained, not wet. May be allowed to dry out for brief periods without harm. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. This rare species should be propagated whenever possible. *Fertilise* at 1/4 to 1/2 strength weekly when in active growth.

Comments: A very choice species, *Dendrochilum auriculare* is quite rare in cultivation. Both the plant and flowers are attractive. The handsome, dark green leaves have a texture reminiscent of thin, pliable leather, and are attached by a thin petiole to a relatively small pseudobulb. The downward-arching inflorescences have individual, widely open flowers that are fairly large for a *Dendrochilum*. Plants in cultivation tend to bloom during the winter, but have also been seen in flower in late spring. This species belongs to section *Eurybrachium*.



Figure 4.514 (above) Elegant inflorescences of *Dendrochilum auriculare* (Grower: Ron Parsons).

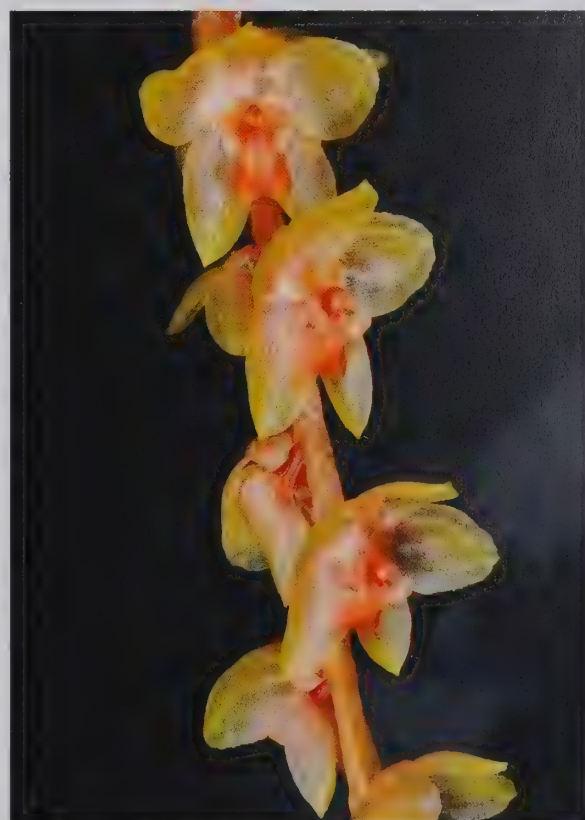


Figure 4.515 (above) *Dendrochilum auriculare* flowers in detail (Grower: Marni Turkel).

DENDROCHILUM

Dendrochilum curranii Ames

Publication: *Orchidaceae* 3: 15 (1908)

Etymology: Named for Hugh McCullom Curran (1875–1960), the American botanist who first collected the type specimen. He did this in 1908, on Mt. Makiling, when working as a forest officer for the Bureau of Forestry in Manila.

Homotypic synonyms: *Acoridium curranii* (Ames) Ames.

Morphology: Plant to 15 cm tall, clumping, much branched, rhizome slowly ascending, pseudobulbs clustered, slowly creeping. *Pseudobulb* to 3 cm tall by 0.5 cm wide, narrowly conical, with persistent bracts. *Leaf* to 12.5 cm long by 1 cm wide, petiole to 2 cm, lanceolate to narrowly linear, apex obtuse, lamina erect, flexible, thinly leathery. *Inflorescence* a raceme, 12–15 cm long, longer than leaves, flowers distichous, peduncle erect, rachis to 5 cm, suberect to descending, filiform, arising from centre of emerging new growth. *Flower* to 0.35 cm in diameter, many in number, resupinate, simultaneous, widely spreading.

Range, elevation and habitat: Endemic to the Philippines on the islands of Luzon (provinces of Albay, Benguet, Laguna, Pampanga, Quezon and Rizal), Mindoro and Leyte. *Dendrochilum curranii* is found at elevations of 600–2000 m where it grows as a common epiphyte in wet montane forest, usually blooming between December and February, although May blooms have been reported.

Culture recommendations: *Substrate* pot in New Zealand *Sphagnum* moss or a fine bark mix. This species may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of moss around the roots. *Temperature* intermediate to cool, depending on provenance of plant, but best kept above 10 °C (50 °F) at night. *Light* bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* easily from division, or seed. *Fertilise* at 1/4 strength weekly.

Comments: A charming little species of *Dendrochilum*, *D. curranii* can bloom with numerous inflorescences of lacy white flowers, usually in mid-winter in cultivation. It belongs to section *Convolutum*. This species is easy to grow and flower, and the blooms last 10–14 days, looking particularly attractive when grown on a mount.



Figure 4.516 (above) A spray of *Dendrochilum curranii* inflorescences (Grower: Mary Gerritsen).



Figure 4.517 (above) *Dendrochilum curranii* flowers in detail (Grower: Mary Gerritsen).

DENDROCHILUM

Dendrochilum parvulum (Ames) Pfitzer

Publication: in H.G.A. Engler (ed.), *Pflanzenr.*, IV, 50 II B 7: 116 (1907)

Etymology: From the Latin *parvulus* (small size) in reference to the small plant.

Homotypic synonyms: *Acoridium parvulum* Ames.

Morphology: Plant to 5 cm tall, occasionally larger, clustered, much branching, rhizome gradually ascending, creeping, *Pseudobulb* to 0.6 cm long by 0.25 cm wide, narrowly conical to narrowly ovoid. *Leaf* to 3 cm long by 0.5 cm wide, shortly petiolate, linear oblong to narrowly elliptic, apex obtuse to rounded, minutely bilobed, lamina flexible. *Inflorescence* a raceme, to 6.5 cm long, occasionally slightly longer, peduncle approximately 3 cm, flowers densely arranged and distichous, peduncle erect to suberect, rachis suberect to descending, filiform, arising from centre of emerging new growth. *Flower* 0.3–0.4 cm tall, numerous, to 20 or more, simultaneous, resupinate, spreading, slightly campanulate. Flowers vary from white to golden yellow, and some forms have a reddish lip.

Range, elevation and habitat: *Dendrochilum parvulum* is widespread and locally common in the Philippines, on the islands of Luzon (provinces of Bataan, Benguet, Cagayan, Kalinga-Apayao, Laguna, Mountain Province, Nueva Viscaya, Quezon, and Rizal), and Mindanao (provinces of Lanao and Misamis), where it grows above 1200 m as an epiphyte in mossy, montane cloud forest and open areas on solitary trees. Plants bloom between March and July and between October and January in nature.

Culture recommendations: *Substrate* pot in New Zealand *Sphagnum* moss or a fine bark mix. This species may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of moss around the roots. *Temperature* intermediate to cool. *Light* bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* from division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Dendrochilum parvulum*, of section *Acoridium*, is one of the most highly desirable species in this genus. As with most *Dendrochilum*, it can be a prolific bloomer, its many spikes of densely arranged, white to yellowish flowers putting on a striking display. In nature, plants of this species tend to be substantially smaller; in cultivation plants may have leaves to 6 cm long by 0.7 cm wide and pseudobulbs to 0.6 cm long by 0.4 cm wide. *Dendrochilum parvulum* prefers coolish conditions and, when happy, grows to specimen size relatively quickly, branching in many directions. Plants in cultivation bloom in mid-winter.

Figure 4.520 (following page) Numerous *Dendrochilum parvulum* inflorescences project from a vertical mount (Grower: Hanging Gardens).



Figure 4.518 (above) Pendent *Dendrochilum parvulum* inflorescences (Grower: Golden Gate Orchids).



Figure 4.519 (above) The fine flowers of *Dendrochilum parvulum* (Grower: Golden Gate Orchids).



DENDROCHILUM

Dendrochilum rhombophorum (Rchb.f.) Ames

Publication: *Orchidaceae* 3: 7 (1908)

Etymology: From the Greek *rhombos* (rhombus) and *phorus* (bearing) referring to the shape of the pseudobulb.

Homotypic synonyms: *Coelogyne rhombophora* Rchb.f., *Acoridium rhombophorum* (Rchb.f.) Ames.

Heterotypic synonyms: *Pholidota rhombophora* Rchb.f., *Acoridium whitfordii* Rolfe, *Dendrochilum whitfordii* (Rolfe) Pfitzer & Kraenzl.

Morphology: *Plant* to 13.5 cm tall, occasionally slightly larger, clumping, much branched, pseudobulbs clustered, slowly creeping. *Pseudobulb* to 3.5 cm tall by 0.6 cm wide, ovoid to narrowly conical. *Leaf* to 10 cm long by 1 cm wide, petiolate, linear to linear-oblong to linear-lanceolate, apex acute, acuminate, lamina erect to suberect, flexible. *Inflorescence* a raceme, to 12.5 cm long, longer than leaves, flowers distichous, with yellowish to greenish subtending bracts that age brown, peduncle erect to suberect, rachis suberect to descending, filiform, arising from centre of emerging new growth. *Flower* to 0.5 cm wide, to 30 in number, resupinate, simultaneous, widely spreading. Flowers vary in colour from creamy yellow or bright yellow-green to green.

Range, elevation and habitat: *Dendrochilum rhombophorum* occurs in the Philippines on the islands of Luzon (provinces of Albay, Bataan, Laguna, Quezon and Rizal), Leyte, and Mindanao (province of Surigao), generally at elevations over 1000 m. It grows as an epiphyte in moist montane forest. Plants bloom in nature between March and June. This species is uncommon, but appears to be secure.

Culture recommendations: *Substrate* pot in New Zealand *Sphagnum* moss or a fine bark mix. This species may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of moss around the roots. *Temperature* intermediate to cool. *Light* bright shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* from division or seed. *Fertilise* at 1/4 to 1/2 strength weekly when in active growth.

Comments: *Dendrochilum rhombophorum* is uncommon in cultivation, but would make a lovely addition to any miniature orchid collection. The prolific chains of pale flowers are eye-catching. It belongs to section *Acoridium*, and as with most *Dendrochilum*, it flowers prolifically, producing showers of blooms during late autumn to winter.



Figure 4.521 (above) The fine flowers of *Dendrochilum rhombophorum* (Grower: Steve Beckendorf).



Figure 4.522 (above) Detail of the flowers of *Dendrochilum rhombophorum* (Grower: Cindy Hill).

***Dickasonia* L.O.Williams**

Publication: Williams, L. O., 1941, *Bot. Mus. Leafl.* 9: 37

Subfamily: Epidendroideae

Tribe: Coelogyneae

Subtribe: Coelogyginae

Type species: *Dickasonia vernicosa* L.O.Williams, 1941, *Bot. Mus. Leafl.* 9: 38.

Etymology: Named for Dr. Frederick G. Dickason (1904–1990), an American missionary who taught botany at Judson College, India, and later in Burma, and who collected the type material in April, 1937.

Heterotypic synonym: *Kalimpongia* Pradhan.

Profile: A monotypic genus from northeast India, Myanmar and Bhutan.

General plant morphology: Sympodial and epiphytic. See description in species entry.



Figure 4.523 (above) The captivating bloom of *Dickasonia vernicosa*, a cool growing taxon from Asia (Grower: Hanging Gardens).

DICKASONIA

Dickasonia vernicosa L.O. Williams

Publication: *Bot. Mus. Leaflet* 9: 38 (1941)

Etymology: From the Latin *vernicosus* (glossy, varnished), most probably referring to the shiny pseudobulbs.

Heterotypic synonym: *Kalimpongia narajitii* Pradhan.

Morphology: *Plant* 7–12 cm tall, clumping, pseudobulbs clustered, slowly creeping, rhizome branching. *Pseudobulb* to 3 cm long by 2 cm wide, obliquely ovoid to globose to conical, smooth to wrinkled, shiny, subtended by non-leafy basal bracts, erect to obliquely erect, leaf apical, unifoliate, rarely bifoliate. *Leaf* 4.5–12 cm long by 0.6–2.5 cm wide, petiolate, lanceolate to lanceolate-elliptic, apex acute, lamina arcuate, suberect to slightly spreading, margins somewhat undulate. *Inflorescence* a raceme, 2–6 cm long, flowers sub-secund, with prominent, brown subtending bracts below pedicel, slightly broader at each node, pendent, slender, heteranthous. *Flower* 1–1.8 cm wide, 3–9 in number, resupinate, spreading, campanulate, crystalline in texture, subtly fragrant, lip adnate to short column.

Range, elevation and habitat: *Dickasonia vernicosa* occurs in Myanmar, Bhutan and northeast India at elevations of 1700–2500 m, where it is locally common. It grows as an epiphyte, sometimes in deep shade, in cool, humid montane mossy forest that is mist covered in the monsoon season, but dry in winter. Plants in nature flower in March and April.

Culture recommendations: *Substrate* pot in New Zealand *Sphagnum* moss or a fine bark mix. This species may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of moss around the roots. Although it may be grown in either fashion, it is more attractive when mounted due to its pendent inflorescences. *Temperature* intermediate-cool to cool. *Light* bright shade. *Watering* keep moist, well drained, not wet. Reduce water in the autumn or as pseudobulbs mature, and keep much drier in the winter, misting roots at least every 10–14 days. *Humidity* high. *Air movement* good to brisk. *Propagation* from division or seed. *Fertilise* at 1/4 strength until bulbs mature, withholding fertiliser during dormancy.

Comments: *Dickasonia vernicosa* has been in cultivation for many years, but surprisingly, many plants can still be found labelled as *Kalimpongia narajitii*. It is not a common species in collections, perhaps due to its cool-growing requirements. When in bloom, this captivating species has pendent spikes of pristine white flowers that contrast with the reddish-brown bracts clasping the base. Particularly attractive when grown on a mount, the sprays of outward-facing blooms usually dangle below the plant. An added feature of this lovely species is its clustered, glossy pseudobulbs.

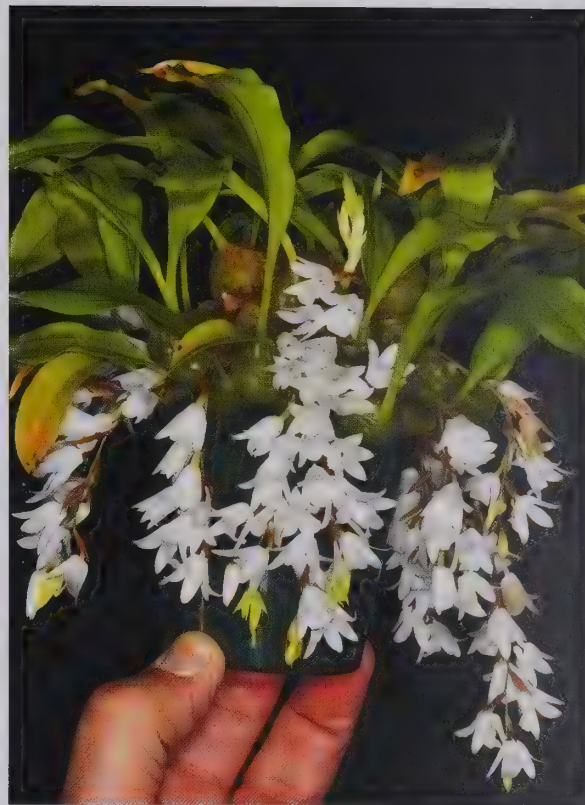


Figure 4.524 (above) A delightful pot of *Dickasonia vernicosa* plants in full bloom (Grower: Cindy Hill).



Figure 4.525 (above) *Dickasonia vernicosa* flowers in detail (Grower: Cindy Hill).

DICKASONIA

Dickasonia vernicosa is reminiscent of a small white *Coelogyne*, not entirely surprising since that genus is one to which this taxon is closely related. In cultivation, plants bloom in very late winter to early spring.



Figure 4.526 (above) A pendent *Dickasonia vernicosa* inflorescence in cultivation (Grower: Hanging Gardens).



Figure 4.527 (above) Mounted *Dickasonia vernicosa* plants in flower display to great effect (Grower: Marni Turkel).

Dinema Lindl.

Publication: Lindley, J., 1826, *Orchid. Scelet.*: 16

Subfamily: Epidendroideae

Tribe: Epidendreae

Subtribe: Laeliinae

Type species: *Dinema polybulbon* (Sw.) Lindl., 1831, *Gen. Sp. Orchid. Pl.*: 111.

Etymology: From the Greek *di* (double) and *nema* (thread, slender), a reference to the porrect column wings.

Profile: A monotypic genus found from Mexico to Central America and the Caribbean.

General plant morphology: Sympodial. See description in species entry.



Figure 4.528 (above) The mesmerising *Dinema polybulbon* (Grower: Golden Gate Orchids).

DINEMA

Dinema polybulbon (Sw.) Lindl.

Publication: *Gen. Sp. Orchid. Pl.*: 111 (1831)

Etymology: From the Greek *poly* (many) and *bolbos* (bulb) referring to the numerous pseudobulbs.

Homotypic synonyms: *Epidendrum polybulbon* Sw., *Encyclia polybulbon* (Sw.) Dressler.

Heterotypic synonyms: *Bulbophyllum occidentale* Spreng., *Epidendrum polybulbon* var. *luteoalbum* Miethe, *Epidendrum cubincola* Borhidi, *Dinema cubincola* (Borhidi) H.Dietr.

Morphology: Plant to 6 cm tall (individual growths), creeping, much branched, mat-forming, pseudobulbs spaced 0.5–3.5 cm apart. *Pseudobulb* 1.1–3 cm tall by 0.3–0.8 cm wide, ovoid to narrowly ovoid to cylindrical-ellipsoid, leaves apical, 2–3 in number. *Leaf* 1–1.5 cm long by 0.4–0.9 cm wide, elliptic-lanceolate to elliptic-ovate, apex bilobed, lamina ascending to spreading, thinly leathery, flexible. *Inflorescence* a raceme, to 2 cm long, erect, terminal. *Flower* 2.5–3 cm wide, 1, rarely 2, in number, resupinate, widely spreading, fragrant.

Range, elevation and habitat: A very widespread species, *Dinema polybulbon* grows in Mexico (states of Chiapas, Oaxaca, Puebla and Veracruz, 800–1500 m), Belize (district of Toledo, 300–750 m), El Salvador (departments of Morazán and Santa Ana, 1200–1800 m), Guatemala (departments of Baja Verapaz, Chiquimula, Santa Rosa, Totonicapán and Zacapa, 1200–3200 m), Honduras (departments of Comayagua, El Paraíso, Francisco Morazán, La Paz and Ocotepeque), Nicaragua (departments of Estelí, Jinotega, Matagalpa and Nueva Segovia, 1000–1500 m), Panama (province of Chiriquí), Cuba, Jamaica and the Windward Islands. This locally common species grows as an epiphyte, and occasionally as a lithophyte, often in large colonies in a variety of habitats, including wet mixed forest, semi-evergreen forest, short semi-deciduous forest, dry or humid open oak and pine-oak ridge forest, and dense pine forest. Depending on where this species is found, plants may be seen flowering between September and March, or between March and June.

Culture recommendations: *Substrate* mounted on a large flat piece of cork bark, rough wood shingles or tree fern, using New Zealand *Sphagnum* moss around the roots. If humidity is sufficient, this plant can be grown on mounts without moss. It may also be grown in bulb pans or baskets in a fast draining mix, but due to its sprawling habit it may soon outgrow this situation. *Temperature* warm-intermediate to cool depending on provenance of plant. *Light* bright diffuse to bright shade. *Watering* keep moist, well drained, not wet. Plants are not harmed by brief dry periods. Reduce water in winter, but do not withhold. *Humidity* high. *Air movement* good to brisk. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly.



Figure 4.529 (above) A profusion of *Dinema polybulbon* plants in flower (Grower: Mary Gerritsen).



Figure 4.530 (above) The bloom of *Dinema polybulbon* in detail (Grower: Golden Gate Orchids).

DINEMA

Comments: *Dinema polybulbon* is a common and easily obtainable species, but that should not be a deterrent. The surprisingly and pleasingly fragrant flowers are quite large in relation to the plant and, when combined with its ease of culture, make this species a desirable addition to any collection. *Dinema polybulbon* is closely related to the genus *Encyclia*, and has attractive, usually egg-shaped pseudobulbs, somewhat like those of members of the latter genus. However, the inflorescence is quite short, in common with some members of another closely related genus, *Prosthechea*. The plants branch frequently and can easily grow to specimen size if allowed. Indeed, specimen plants can be spectacular when in full bloom; plants 60 cm (2 feet) in diameter with hundreds of flowers have been seen. In cultivation, *D. polybulbon* tends to bloom between early autumn and mid-winter, or in early summer.



Figure 4.531 (above) A pair of *Dinema polybulbon* blooms. This readily available taxon is both attractive and easy to grow (Grower: Mary Gerritsen).

Diodonopsis Pridgeon & M.W.Chase

Publication: Pridgeon, A. M. & Chase, M. W., 2001, *Lindleyana* 16: 252

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Diodonopsis pygmaea* (Kraenzl.) Pridgeon & M.W.Chase, 2001, *Lindleyana* 16: 253 (formerly *Masdevallia pygmaea*).

Etymology: From *Diodon* (genus of Porcupine Pufferfish) and *-opsis* (like, looking like) referring to the appearance of the softly spiny or papillose ovary.

Profile: A genus of 5 species from Costa Rica, Panama, Colombia, Ecuador, Peru and Bolivia.

General Plant morphology: Sympodial, epiphytic or lithophytic, caespitose. *Ramicaul* generally shorter than leaves, enclosed in sheaths. *Leaf* linear, elliptic to obovate, shortly petiolate, leathery. *Inflorescence* a raceme, peduncle terete, borne laterally from the ramicaul with an annulus at considerable distance below the leaf-stem abscission layer. *Flower* one to few, successive, resupinate, sepals obtuse to acute, with or without short sepaline tails, fused at base for part of their length, lip more or less oblong, hinged flexibly from a curved extension at end of the column foot, ovary carinate and echinate or papillose, pollinia 2.

Comments: *Diodonopsis*, in common with most pleurothallids, is prone to bean yellow mosaic virus. (BYMV). Good aseptic technique should be used when repotting, and care should be taken to prevent aphid infestations as aphids are the vector for BYMV.



Figure 4.532 (above) The intriguing little flowers of *Diodonopsis hoeijeri* (Grower: Marni Turkel).

DIODONOPSIS

Diodonopsis erinacea (Rchb.f.) Pridgeon & M.W.Chase

Publication: *Lindleyana* 16: 253 (2001)

Etymology: From the Latin *erinaceus* (spiny), but named for the genus *Erinaceus*, the hedgehogs, a group of spiny, insectivorous mammals, referring to the bristly flowers and ovary.

Homotypic synonyms: *Masdevallia erinacea* Rchb.f., *Scaphosepalum erinaceum* (Rchb.f.) Schltr.

Heterotypic synonyms: *Masdevallia echinocarpa* Schltr., *Masdevallia horrida* Teusch. & Garay.

Morphology: Plant 2–4.5 cm tall, densely clumping, much branched, erect. *Ramicaul* 0.2–1.5 cm long, erect, enclosed in sheaths. *Leaf* 2–3 cm long by 0.2–0.6 cm wide, subpetiolate, narrowly linear to nearly terete, apex acute, lamina erect, leathery. *Inflorescence* a raceme, peduncle 3–6 cm long, slender, erect, originating from low on the ramicaul. *Flower* 1–2 cm, 1–3 in number, successive, resupinate, campanulate, rounded sepaline cup shallow, with fine, distinctly clavate, sepaline tails abruptly extending from the cup, sepals vary from greenish to yellowish, and may be mottled with reddish-brown to purple. Variation is slight, but includes plant and flower size, sepaline tail length, and small differences in sepaline cup shape.

Range, elevation and habitat: Widespread, found in Costa Rica (provinces of Alajuela, Heredia, Puntarenas and San José), Panama (provinces of Chiriquí, Colón and Panamá), Colombia (departments of Antioquia, Cauca and Chocó), Ecuador (province of El Oro), and recently in Peru (P. Bermudez, pers. comms., 2009). *Diodonopsis erinacea* occurs between 200–2000 m elevation, growing as an epiphyte in warm, wet, low elevation forest to cool, moist, montane, rain and cloud forests.

Culture recommendations: *Substrate* pot in a fine bark mix or New Zealand *Sphagnum* moss. Plants may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or tree fern using moss around the roots. *Temperature* Warm to cool, depending on plant provenance. If uncertain, grow in intermediate conditions. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good.

Comments: This species has been known as *Masdevallia erinacea* for many years, and few collections would have labels bearing the name *Diodonopsis erinacea*. However, it is one of only five species that are genetically different enough from *Masdevallia* to be afforded a separate genus. Those unfamiliar with this species are usually struck by its appearance, words such as “cute”, “outrageous”, “fuzzy”, “bug-like”, and “amazing” all being valid adjectives for this wonderful species. A perfect selection for any miniature collection, it is readily available, not uncommon in collections, relatively easy to cultivate, and can bloom in any month of the year.



Figure 4.533 (above) The wonderful nodding flower of *Diodonopsis erinacea* (Grower: Elle Ronis).



Figure 4.534 (above) A pair of *Diodonopsis erinacea* blooms (Grower: Howard Gunn).

Domingoa Schltr.

Publication: Schlechter, F. R. R., 1913, in *I. Urban, Symb. Antill.* 7: 496

Subfamily: Epidendroideae

Tribe: Epidendreae

Subtribe: Laeliinae

Type species: *Domingoa nodosa* (Cogn.) Schltr., 1913, in *I. Urban, Symb. Antill.* 7: 497.

Etymology: Named for Santo Domingo, the capital of the Dominican Republic and former capital of the island of Hispaniola, where the type specimen was collected.

Heterotypic synonyms: *Hartwegia* Lindl., nom. illeg., *Nageliella* L.O. Williams.

Profile: A genus of 4 epiphytic species and 1 natural hybrid occurring in Mexico, El Salvador, Guatemala, Honduras, Nicaragua, Cuba, the Dominican Republic and Puerto Rico.

General plant morphology: Sympodial, miniature, creeping, clustered. erect. *Pseudobulb* elongate, enclosed in papery sheaths, leaf terminal, unifoliate. *Leaf* almost linear, fleshy. *Inflorescence* a raceme, terminal, enclosed in papery bracts. *Flower* several, successive, resupinate, not spreading widely, lip bilobed at apex with two long, linear calli, column slender, slightly curved, three-lobed or three winged at apex, pollinia 4.

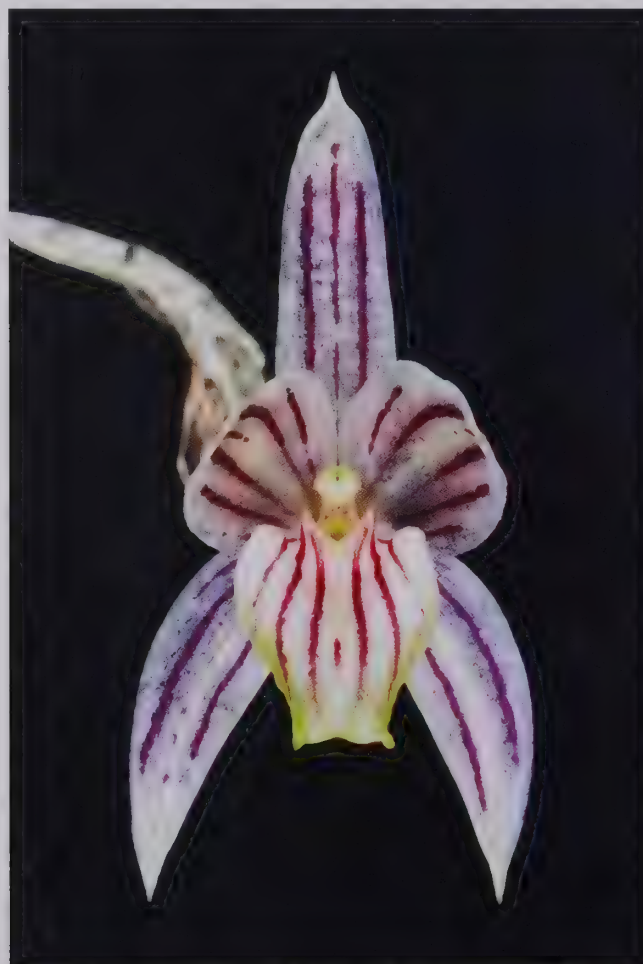


Figure 4.535 (above) The strikingly veined *Domingoa nodosa* flower (Grower: Lilian Severin).

DOMINGOA

Domingoa haematochila (Rchb.f.) Carabia

Publication: *Mem. Soc. Cub. Hist. Nat. "Felipe Poey"* 17: 143 (1943)

Etymology: From the Greek *haimatos* (blood) and *chila* (lip), referring to the colour of the labellum.

Homotypic synonym: *Epidendrum haematochilum* Rchb.f.

Heterotypic synonyms: *Epidendrum broughtonioides* Griseb., *Domingoa hymenodes* Schltr.

Morphology: *Plant* 7–15 cm (rarely larger), creeping, branching, stems clumping at base, erect. *Pseudobulb* to 5 cm tall by up to 0.5 cm wide, thin, narrow, stem-like, cylindrical, erect to suberect, covered by sheaths, leaf apical, unifoliate. *Leaf* 3–10 cm long by 1.2 cm wide, lanceolate-ovate to narrowly oblong, apex acute to obtuse, apiculate, lamina erect, rigid, leathery, suffused with red. *Inflorescence* a raceme, 4–15 cm long, longer than leaves, blooming repeatedly for up to three seasons, covered with persistent papery bracts for all of its length, erect to suberect, terminal. *Flower* 2.5–3 cm tall, 1–3 in number, successive, resupinate, widely spreading except for somewhat forward-pointing petals, fragrant. Petals and sepals vary from yellow to greenish.

Range, elevation and habitat: *Domingoa haematochila* grows in Cuba, Hispaniola and Puerto Rico at elevations from near sea level to 600 m, rarely to 1100 m. It grows as an epiphyte in a variety of habitats including shady areas of coastal forest, on trees on coastal plains, in pine woodland, on small trees along rocky cliffs, in limestone hill forest, in cloud forest and even on cultivated trees (e.g. *Citrus*, mango). This species tends to bloom between May and September in nature. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or tree fern. This species is probably not well suited to potted culture, but if potted, use a fast draining mix. *Temperature* warm to warm-intermediate with a cooler winter rest of 12–15 °C (54–59 °F). *Light* bright shade to medium shade. *Watering* water then allow to dry briefly. If grown in areas with short winter days and long overcast periods, reduce watering to reduce the risk of rot. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly whilst in growth, but withhold during winter.

Comments: *Domingoa haematochila* is not commonly seen in collections, but it is an attractive species. The fragrant flowers have somewhat sombre colouration, but are very handsome. Individual inflorescences may bloom for up to three years; covered by papery bracts, they may not appear alive, but do not cut them back believing they are finished! Peeling back the bracts may show green and healthy tissue beneath. This species tends to bloom in cultivation between early spring and mid-summer. A rare natural hybrid with the related *D. nodosa* is known as *Domingoa × susiana* Dod.



Figure 4.536 (above) *Domingoa haematochila* may bloom repeatedly from the same inflorescence (Grower: Brad Cotten).



Figure 4.537 (above) *Domingoa haematochila* flowers are sombrely coloured, but attractive (Grower: Andy's Orchids).

Dracula Luer

Publication: Luer, C. A., 1978, *Selbyana* 2: 190

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Dracula chimaera* (Rchb.f.) Luer, 1978, *Selbyana* 2: 194 (formerly *Masdevallia chimaera*).

Etymology: From the Latin *draco* (dragon), and the diminutive *-ula*, referring to the appearance of the flowers.

Profile: A genus of more than 120 species, several of which are regarded as being of genetically stable natural hybrid origin. Many species were originally described as *Masdevallia*. *Dracula* range from Chiapas, Mexico, and south to Peru, growing in wet or cloud forest at elevations ranging from 300–2800 m, the majority occurring between 1500–2500 m.

General plant morphology: Sympodial, epiphytic, occasionally terrestrial, caespitose to shortly repent, rhizome much branched. *Ramicaul* shorter than leaves. *Leaf* conduplicate, linear to elliptical to oblanceolate, apex often acute, minutely notched and apiculate, lamina longitudinally sulcate, keeled midrib on ventral surface, thinly leathery. *Inflorescence* unbranched, terete, usually pendent, but if erect, flowers pendent, borne laterally with an annulus low on the ramicaul. *Flower* resupinate, sepals ovate, usually soft and fleshy, sepals partially to nearly entirely connate at the base, internal surface often pubescent, sepaline tails usually long, lip fleshy, often fungoid in appearance, hinged to the column foot on all but a few species, pollinia 2. The flowers of most species are sensitive to higher temperatures and extremely susceptible to low humidity, wilting easily.

Comments: The plants and flowers of most species are sensitive to higher temperatures and the flowers are extremely susceptible to low humidity, wilting easily. All species of *Dracula*, like most pleurothallids, are prone to bean yellow mosaic virus. (BYMV). Good aseptic technique should be used when repotting and care should be taken to prevent aphid infestations as aphids are the vector for BYMV.



Figure 4.538 (above) *Dracula felix* bears flowers that are smaller for the genus *Dracula* as a whole, but it is not a true miniature as plants may grow to 25 centimetres (10 inches) or more in height (Grower: John Leathers).

DRACULA

Dracula cochliops Luer & R. Escobar

Publication: *Orquideologia* 13: 119 (1979)

Etymology: From the Greek *kokhlias* (snail) and *ops* (eye) referring to the distinctive form of the petals.

Morphology: *Plant* 8–12 cm tall, shortly repent, appearing caespitose, freely branching, erect. *Ramicaul* 1–2 cm long, erect, slender, enclosed in sheaths. *Leaf* 7–10 cm long by 0.7–0.8 cm wide, gradually tapering towards base into indistinct petiole, narrowly elliptical, apex acute, lamina erect. *Inflorescence* a raceme, peduncle 8–11 cm long, erect to descending, slender, borne from low on ramicaul. *Flower* 4–6 cm tall, single, successively few flowered, erect to nodding, hirsute, widely spreading with long sepaline tails, lip shallowly concave, oblong, with three longitudinally raised calli, hinged, petals stalked, clavate.

Range, elevation and habitat: *Dracula cochliops* is found in one valley in the Department of Putumayo, southwestern Colombia, at 2200 m. It grows epiphytically in a cloud forest remnant. This species is listed as endangered on the IUCN Red List.

Culture recommendations: *Substrate* grow in a basket using New Zealand *Sphagnum* moss or a fine bark mix. This species is not really suited to pots due to the descending nature of the inflorescences. It may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or tree fern using moss around the roots. *Temperature* intermediate-cool to cool. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Dracula cochliops* has one of the smallest plants in the genus, and the flowers have a very distinctive, if not unique, appearance. The specific name translates to “snail eyes”, and the stalked petals are certainly molluscan in appearance. This species and *D. andreetae* are the only two in the genus with unusual stalked petals, although those of *D. cochliops* are conspicuously clubbed at the end. Additionally, *D. andreetae* has much larger flowers that look completely different. Like most plants in this genus, *D. cochliops* is most attractive when grown in a basket or on a mount to show off its incredible flowers to the best advantage. This species could be grown in a pot since most spikes are slightly ascending, but if grown in this manner, ensure that the base of the plant is level with the edge of the pot or even slightly mounded. Although *Dracula* do very well on mounts, their prolific growth and branching habit may ultimately produce plants that are too heavy. *Dracula cochliops* tends to bloom between late autumn and mid-winter in cultivation.



Figure 4.539 (above) The unique flowers of *Dracula cochliops* with their stalked petals (Grower: John Leathers).

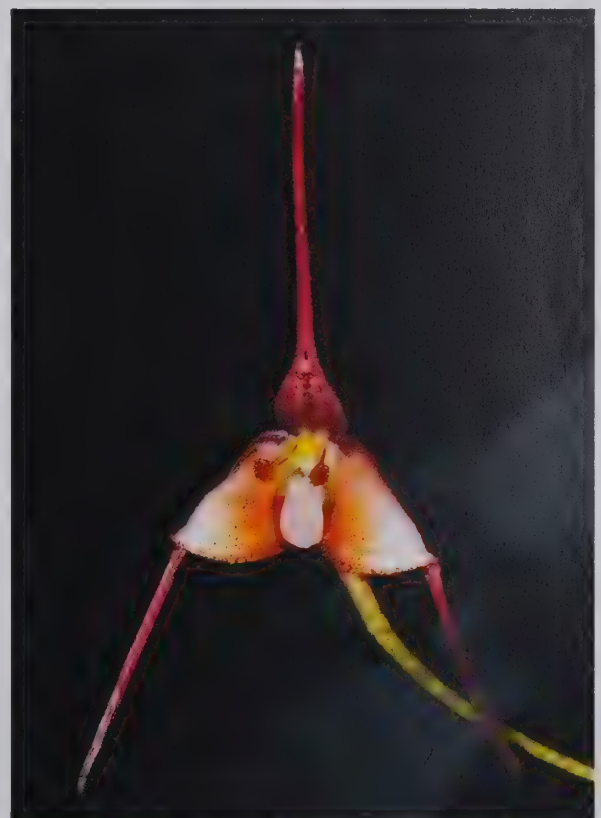


Figure 4.540 (above) *Dracula cochliops* flowers are relatively large, but delicately proportioned (Grower: John Leathers).

DRACULA

Dracula janetiae (Luer) Luer

Publication: *Selbyana* 2: 195 (1978)

Etymology: Named in honour of Janet Kuhn, one of the original owners of J & L Orchids, Connecticut, who discovered this species in Peru.

Homotypic synonym: *Masdevallia janetiae* Luer.

Morphology: Plant 10–15 cm tall, rarely larger, densely clumping, much branching, erect. *Ramicaul* 2–3 cm long, erect, slender, enclosed in sheaths. *Leaf* 8–13 cm long, including 3–4 cm petiole, by 1.5–2 cm wide, narrowly elliptical, apex acute, lamina erect. *Inflorescence* a raceme, peduncle 7–10 cm long, horizontal to descending, borne from low on ramicaul. *Flower* to 8 cm tall, one to several in number, successive, hirsute, widely spreading, with long sepaline tails, lip flat, round, minutely verrucose and hinged.

Range, elevation and habitat: *Dracula janetiae* was collected in central Peru, in a forest between Tingo Maria and Pucallpa (Leoncio Prado Province in the Department of Huánuco), at an elevation of approximately 1700 m. It remains a rare species. No confirmed bloom-time records of this species are known. The conservation status of *Dracula janetiae* is unknown, but is likely a rare species.

Culture recommendations: *Substrate* grow in a basket using New Zealand *Sphagnum* moss or a fine bark mix. This species is not really suited to pots due to the descending nature of the inflorescences; if grown potted, inflorescences may bury themselves unseen in the medium. Plants may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or tree fern using moss around the roots. *Temperature* intermediate-cool to cool. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: This beautiful species is one of only six *Dracula* currently known from Peru. Whilst rare, it grows relatively rapidly and branches freely, allowing for periodic divisions to be made. It is very similar to two other species, *D. nycterina* and *D. vespertilio*. *Dracula nycterina* comes from the Central Cordillera of western Colombia and has a cup-like lip with raised longitudinal veins. *Dracula vespertilio* ranges from Nicaragua south to northwest Ecuador and has a concave lip that is completely smooth within. The larger plants of *D. janetiae* are borderline candidates for inclusion in this work, and plants in cultivation may grow taller due to the softer conditions and regular applications of dilute fertiliser. Plants in collections may bloom in any month of the year, but blooms are less likely in winter.

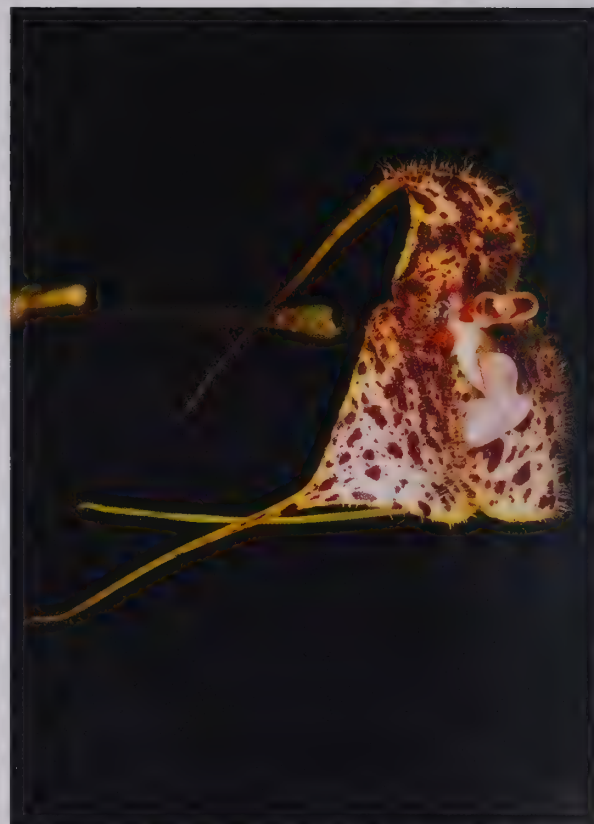


Figure 4.541 (above) The handsome flower of *Dracula janetiae*, a species from Peru (Grower: J & L Orchids).



Figure 4.542 (above) The *Dracula janetiae* bloom in dramatic profile (Grower: J & L Orchids).

DRACULA

Dracula lotax (Luer) Luer

Publication: *Selbyana* 2: 195 (1978)

Etymology: From the Greek *lotax* (clown), referring to the overall appearance given to the flower by the typical pattern of colour.

Homotypic synonym: *Masdevallia lotax* Luer.

Morphology: *Plant* 7–12.5 cm tall, much branched, shortly repent yet densely clumping. *Ramicaul* 1–2 cm long, erect to suberect, slender, enclosed in sheaths. *Leaf* 6–10.5 cm long by 0.5–0.6 cm wide, indistinct petiole, narrowly elliptic, apex acute, lamina erect. *Inflorescence* a raceme, 5–8 cm long, suberect to descending, slender, borne from low on ramicaul. *Flower* 5–6 cm tall, single, widely spreading, hirsute, with long sepaline tails, lip pandurate, hypochile oblong with erect marginal angles and centrally cleft, epichile transversely elliptical, concave with single, raised, longitudinal lamellae.

Range, elevation and habitat: *Dracula lotax* occurs in the warm rainforests of eastern and southeastern Ecuador (provinces of Morona-Santiago, Pastaza and Zamora-Chinchipec) at elevations of 900–1600 m. It usually blooms from October to November in nature. *Dracula lotax* is listed as vulnerable on the IUCN Red List.

Culture recommendations: *Substrate* grow in a basket using New Zealand *Sphagnum* moss or a fine bark mix. This species is not really suited to pots due to the descending nature of the inflorescences. It may also be mounted on cork bark, rough-barked hardwood, rough wood shingles or tree fern using moss around the roots. *Temperature* intermediate. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* easily by division, or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: Many species of *Dracula* have dark flowers that are somewhat sombre in colouration, but those of *Dracula lotax* are white and cheerful. The specific name *lotax* means “clown”, and refers to the impish face seen by some in the fuzzy blooms. There are several species of *Dracula* with whitish flowers, but most of these have smaller blooms on larger plants, making *Dracula lotax* a desirable species for those with limited growing space. It also prefers intermediate conditions, another bonus for collectors who do not have cool situations. Plants of *D. lotax* generally bloom in mid-spring.



Figure 4.543 (above) The bright flower of *Dracula lotax*, a native of Ecuador (Grower: Brad Cotten).



Figure 4.544 (above) *Dracula lotax* flower corolla in detail (Grower: San Francisco Conservatory of Flowers).

Dresslerella Luer

Publication: Luer, C. A., 1976, *Selbyana* 3: 1

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Dresslerella pertusa* (Dressler) Luer, 1976, *Selbyana* 3: 6.

Etymology: Named in honour of Robert Louis Dressler (1927–), taxonomist and investigator, known for his field work on orchids in tropical America. The suffix *-ella* is a diminutive modifier.

Profile: The genus *Dresslerella* has more than a dozen species, ranging from Guatemala and south to Peru, all of which occur in wet forest and cloud forest at elevations of 300–2100 m.

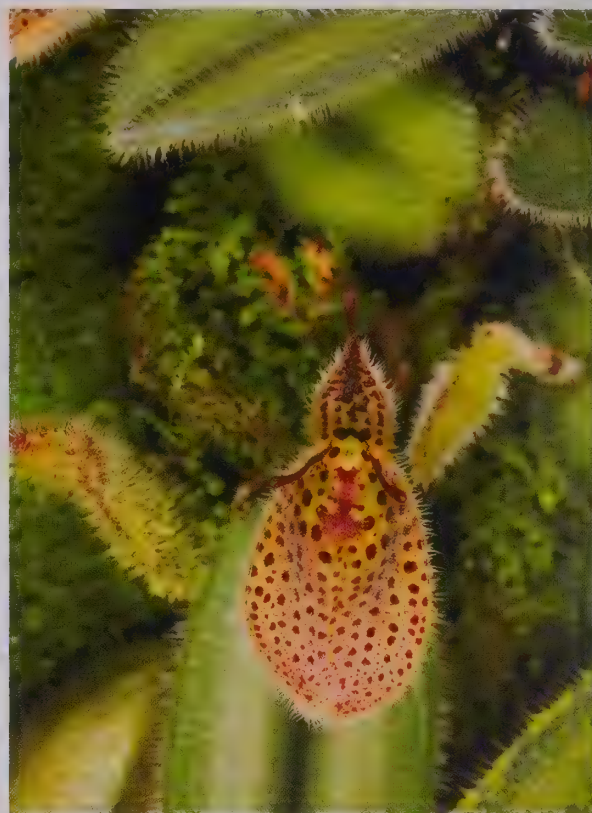
General plant morphology: Sympodial, epiphytic, occasionally lithophytic, small, clumping. *Ramicaul* erect, spreading or pendent, enclosed in sheaths. *Leaf* minutely petiolate, oblong-elliptic to ovate, leathery, hairy. *Inflorescence* successive to two simultaneous, single-flowered raceme, produced from congested, fascicle-like structure at apex of ramicaul on stout peduncle, blooming more than one season. *Flower* single, often resting on or just above leaf surface, successive, sepals pubescent, dorsal sepal free, lateral sepals connate almost to apex to form concave synsepal, pubescent, petals membranous, lip trilobed, hinged to column foot, pollinia 4.

General culture notes: The flowers need very high humidity to open completely. If humidity drops, bud blast (the withering of nascent buds prior to flowering) may occur, or the flowers may open only partially. All species of *Dresslerella*, in common with most pleurothallids, are prone to bean yellow mosaic virus.(BYMV). Good aseptic technique should be used when repotting and care should be taken to prevent aphid infestations as aphids are the vector for BYMV.



Figure 4.545 (above) The leaves and flowers of a mounted *Dresslerella archilae* plant (Grower: MarniTurkel).

DRESSLERELLA***Dresslerella elvallensis* Luer****Publication:** *Selbyana* 3: 2 (1976)**Etymology:** Named after the town of El Valle de Anton, in Coclé province, Panama, where this species occurs.**Morphology:** *Plant* 5–10 cm tall, spreading to pendent, clumping, branching, rosette-like. *Ramicaul* 2–3 cm long, horizontal to pendent, slender to stout, enclosed by pubescent sheaths. *Leaf* 3–7 cm long by 1–2.5 cm wide, sessile, elliptical to oblong, apex sub-acute, lamina erect with respect to ramicaul, prostrate or pendent, thickly leathery, margins minutely ciliate, suffused with purple underneath. *Inflorescence* a raceme, to 2 simultaneous single-flowered inflorescences, to 1 cm long, peduncle 0.3–0.5 cm, stout peduncle, pubescent, borne from apex of ramicaul through sheath at base of leaf. *Flower* 0.9–1 cm long, single, resupinate, barely open, tubular, lateral sepals connate for entire length, forming a tube with a small aperture, dorsal sepal extending beyond synsepal, pubescent, pedicels to 0.5 cm.**Range, elevation and habitat:** The type for this species was collected from the hills above the town of El Valle de Anton, province of Coclé, Panama, at an elevation of 1000 m. It was found growing epiphytically in cloud forest. Conservation status unknown, but it is likely threatened due to human activities.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles, or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not well suited to potted culture due to the prostrate to pendent nature of the plant. *Temperature* intermediate to intermediate-cool. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high to very high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.**Comments:** Rarely seen in cultivation, *Dresslerella elvallensis* is unique in the genus as its nose-like dorsal sepal juts forward past the rest of the flower. It belongs to a group of species in *Dresslerella* with flowers that barely open, leaving just a small aperture for pollinators to enter. Although all members of the genus bloom on short pedicels, this particular group of *Dresslerella* have dark, almost cryptic flowers, themselves held on extremely short inflorescences such that they resemble insects resting upon the leaves. *Dresslerella elvallensis* tends to bloom between late spring and mid-summer, but can also bloom at other times of year.**Figure 4.546 (above)** The unusual, tubular flower of *Dresslerella elvallensis* (Grower: J & L Orchids).**Figure 4.547 (above)** A different clone of *Dresslerella elvallensis* (Grower: Anton Sijm).

DRESSLERELLA***Dresslerella hirsutissima* (C.Schweinf.) Luer****Publication:** *Selbyana* 2: 185 (1978)**Etymology:** From the Latin *hirsutissima* (very hairy, hairiest) probably referring to the pubescence of both the leaves and the flowers.**Homotypic synonyms:** *Pleurothallis hirsutissima* C.Schweinf., *Restrepiella hirsutissima* (C.Schweinf.) Garay & Dunst.**Morphology:** *Plant* 8–10 cm tall, clumping, branching, rosette-like, erect. *Ramicaul* 4–5 cm long, spreading to erect, stout, enclosed by bristly sheaths. *Leaf* 4.5–5 cm long by 1.2–2 cm wide, indistinctly yet shortly petiolate, elliptical-oblong, apex acute to obtuse to rounded, lamina spreading to suberect, fleshy, green to grey-green with darker central vein and margins, densely spotted with reddish purple ventrally, both sides hairy, but dorsal side much more so. *Inflorescence* single-flowered raceme, 5 mm long, 1–5 or more in succession, but with 1–2 simultaneous inflorescences, from fascicle-like structure at apex of ramicaul. *Flower* 2–2.5 cm tall, resupinate, lateral sepals connate to form a shallow bowl, spreading, pedicels pubescent, 0.3–0.4 cm long. Flowers vary in background colour from light pink to reddish-pink, as well as in the size and density of darker spots.**Range, elevation and habitat:** *Dresslerella hirsutissima* is a rare species that occurs in the Cordillera del Condor in southern Ecuador (province of Zamora-Chinchi, 800–1700 m), and central Peru (department of Tarma, 1800 m). It has not been possible to identify any records of collections between these localities, which are over 800 kilometres (500 miles) apart. This species grows as an epiphyte on the mossy lower branches and trunks of trees in cloud forest, and on the tops of trees exposed to sunlight in tall wet montane forest. In nature, flowers have been recorded in March and April.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles, possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not well suited to potted culture due to its prostrate, spreading habit. *Temperature* intermediate to cool. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high to very high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.**Comments:** A rare species both in nature and in cultivation, *Dresslerella hirsutissima* has the largest flowers in the genus. With blooms that are reminiscent of a fuzzy *Restrepia*, the open, darkly spotted, light to reddish pink flowers bloom in cultivation from early summer to mid-autumn. Plants often send up one incredible flower after another at the base of the leaves. Although all *Dresslerella* species require high humidity, the flowers of *D. hirsutissima* are particularly demanding. If the level of humidity is insufficient, the flowers will not open fully, if at all. For many years, the**Figure 4.548 (above)** The phenomenal flower of *Dresslerella hirsutissima* is beautifully decorated (Grower: John Leathers).**Figure 4.549 (above)** *Dresslerella hirsutissima* remains rare in cultivation despite its appeal (Grower: Cindy Hill).

DRESSLERELLA

species now known as *D. lasiocampa* was called *D. hirtuissima* due to an error in taxonomy; as a result, many plants in collections are still mislabelled as such. While the flowers of the two species are somewhat similar, the differences are readily apparent when they are seen together. The flowers of the true *D. hirsutissima* are comparatively large, much more open, and often pinkish in colour. Whilst the flowers of both species are fuzzy, the smaller, distinctly cupped blooms of *D. lasiocampa* are covered in dense white hairs. In addition, the fuzzy leaved plants are also distinct. *Dresslerella hirsutissima* is substantially larger, with leaves to 6 cm long by 2.5 cm wide in cultivation, more prostrate in habit, and possessed of leaves with a dark green, prominent midvein. In contrast, *D. lasiocampa* is smaller, more erect in habit and has leaves of a solid grey-green colour, lacking a darker midvein. Both species are heartily recommended, not only for their exotic and fascinating flowers, but also for the charm of the beautiful foliage.



Figure 4.550 (above) The flowers of *Dresslerella hirsutissima* are sensitive to humidity, and will not open to the full extent illustrated if levels are insufficient (Grower: John Leathers).

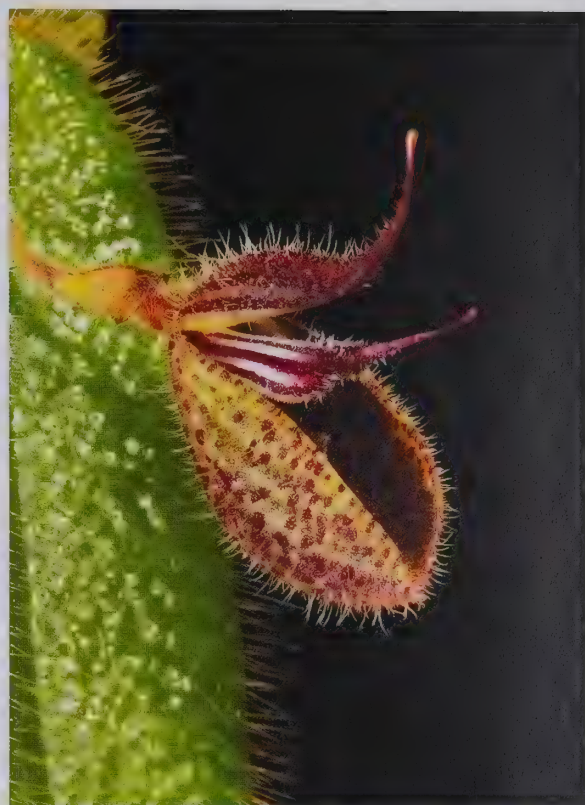
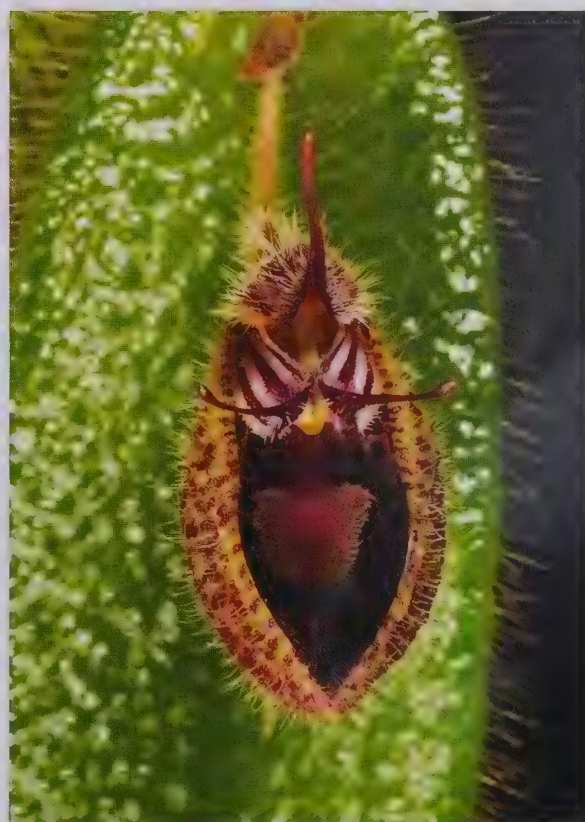


Figure 4.551 *Dresslerella lasiocampa* flower in detail
(Grower: Judy Carney).



Figure 4.552 *Dresslerella* cf. *lasiocampa* is noticeably less hairy (Grower: John Leathers).

DRESSLERELLA***Dresslerella lasiocampa* Luer & Hirtz****Publication:** *Monogr. Syst. Bot. Missouri Bot. Gard.* 103: 278 (2005)**Etymology:** After the moth genus *Lasiocampa*, so named because of the resemblance of the flowers to woolly caterpillars.**Morphology:** *Plant* 3–6.5 cm tall, clumping, branching, rosette-like, erect to suberect. *Ramicaul* 1–3 cm long, erect to suberect, stout, enclosed in hairy sheaths. *Leaf* 2–3.5 cm long by 1.5–2 cm wide, sessile, elliptic-oblong, apex obtuse to rounded, lamina suberect to horizontal, erect to suberect in relationship to ramicaul, fleshy, rigid, verruculose, densely hairy on both sides. *Inflorescence* single flowered raceme, peduncle 1.2–1.4 cm long, with 1–2 (rarely 3) simultaneous inflorescences, slender, suberect, from congested, fascicle-like structure at apex of ramicaul. *Flower* 1.5–1.8 cm long, resupinate, not spreading widely, pubescent, lateral sepals connate for entire length to form cup-like synsepal, pedicels pubescent. 0.6–0.7 cm long.**Range, elevation and habitat:** *Dresslerella lasiocampa* occurs near Chigüinda, Morona-Santiago province, southern Ecuador, at elevations of 1500–1800 m. This species is uncommon and locally distributed in the eastern Andes, where it grows on the trunks of old trees with full exposure to sun. This species is listed as vulnerable on the IUCN Red List.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles, possibly tree fern, using New Zealand *Sphagnum* moss around the roots. The authors have not observed pot-grown examples of this species, but this method may be possible. *Temperature* intermediate to intermediate-cool. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high to very high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.**Comments:** Possibly the most widely cultivated species in the genus, *Dresslerella lasiocampa* is excellent when given the proper conditions. This very desirable plant is a favourite of many collectors; it is beautiful, with fuzzy, fleshy leaves and bristly stems that are home to incredibly intricate flowers covered in soft, white fur. A wonderful trait of the entire genus is the re-blooming habit of the leaves, thus the more leaves there are, the more flowers one has to enjoy! *Dresslerella lasiocampa* is probably most similar to *D. portillae*, though the blooms of the latter are less hairy and the synsepal has a characteristic “pinch” that is readily seen from above. *Dresslerella lasiocampa* was known in cultivation as *D. hirsutissima* for many years, but that name was applied in error. Luer and Hirtz rectified this mistake in 2005, separating this taxon from the latter with a new name (see *D. hirsutissima* for a discussion of the distinguishing features). An amazing little plant, *D. lasiocampa* most frequently blooms between mid-summer and late winter in cultivation.**Figure 4.553 (above)** The cute and fuzzy blooms of *Dresslerella lasiocampa* (Grower: Judy Carney).

DRESSLERELLA***Dresslerella pilosissima* (Schltr.) Luer****Publication:** *Selbyana* 2: 185 (1978)**Etymology:** From the Latin *pilosissima* (very hairy), the superlative of *pilose* (hairy), in reference to the leaves and flowers.**Homotypic synonyms:** *Pleurothallis pilosissima* Schltr., *Restrepia pilosissima* (Schltr.) Ames & C.Schweinf., *Restrepiella pilosissima* (Schltr.) Garay & Dunst.**Morphology:** *Plant* 3.5–12 cm long, clumping, branching, pendent. *Ramicaul* 1–3 cm long, pendent, enclosed in bristly sheaths. *Leaf* 2.5–8 cm long by 1.2–1.8 cm wide, sessile, elliptical, apex acute, lamina pendulous, stiff, leathery, rugose, shiny, dark green, both sides covered with erect white hairs. *Inflorescence* single flowered raceme, 0.5–0.8 cm long including suberect peduncle, 1–2 simultaneous inflorescences, from a fascicle-like structure at apex of ramicaul. *Flower* 1–1.2 cm long, one flower open at a time, resupinate, lateral sepals connate for entire length to form cup-like synsepal, hairy on exterior, not spreading widely, dorsal sepals striped, pedicels pubescent, to 0.5 cm long.**Range, elevation and habitat:** *Dresslerella pilosissima* occurs in central Costa Rica in the Tilarán and Central Volcanic mountain ranges. A rare species, it is known only from one area in the province of Alajuela (no elevation data). It grows epiphytically on tree trunks in cool montane cloud forest, and occasionally as a pseudo-terrestrial in road embankment humus, in very exposed situations.**Culture recommendations:** *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not suited to potted culture due to the pendent plant habit. *Temperature* intermediate to intermediate-cool. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high to very high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.**Comments:** Another extremely choice species, *Dresslerella pilosissima* has fantastic little flowers that hang over and above the striking foliage. The flowers resemble those of *D. lasiocampa* and *D. portillae*, but are not as hairy as those of the former and lack the synsepal “pinch” seen in the latter. They are further distinguished by an attractively striped dorsal sepal. The long, narrow leaves of *D. pilosissima* are beautifully textured, glossy, and covered with somewhat stiff, erect hairs. They hang down from darker, bristly stems, giving the grower a beautiful plant to admire even when not in bloom. Flowers can be expected between mid-summer to late winter if proper growing conditions are provided. However, one must remember that high humidity and coolish temperatures are required for success.**Figure 4.554 (above)** The attractive flower of the Costa Rican *Dresslerella pilosissima* (Grower: Judy Carney).**Figure 4.555 (above)** The flowers of *Dresslerella pilosissima* contrast well with the hairy leaves (Grower: Judy Carney).

DRESSLERELLA***Dresslerella portillae* Luer & Hirtz**

Publication: *Monogr. Syst. Bot. Missouri Bot. Gard.* 88: 102 (2002)

Etymology: Named in honour of José (Pepe) Portillae, president of Ecuagenera Nursery in Cuenca, Ecuador. The nursery specialises in the cultivation, propagation and sale of orchid species native to the country.

Morphology: *Plant* 3–6 cm tall, clumping, branching, erect. *Ramicaul* 3–5.5 cm long, suberect, enclosed in sheaths. *Leaf* 3–4.5 cm long by 1–1.5 cm wide, sessile, elliptical, apex obtuse, lamina spreading to slightly descending, thickly fleshy, dorsal and ventral surfaces hirsute. *Inflorescence* single flowered raceme, 0.1 cm long, 1–2 simultaneous inflorescences, peduncle stout, suberect and pubescent, from fascicle-like structure at apex of ramicaul. Flowers 1–1.2 cm long, resupinate, not spreading widely, lateral sepals connate for entire length to form cup-like synsepal, pinched towards apex, pedicels pubescent, to 0.2 cm long.

Range, elevation and habitat: *Dresslerella portillae* occurs in southeastern Ecuador (province of Morona-Santiago, near Chigüinda) at approximately 1400–1800 m elevation. It is known only from this locality, where it grows epiphytically amongst lichens and mosses in dense cloud forest and wet forest. This species is listed as vulnerable on the IUCN Red List.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. The authors have not observed pot-grown examples of this species, but this method may be possible. *Temperature* intermediate to intermediate-cool. *Light* medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high to very high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Dresslerella portillae* is unusual, even for this curious genus. The synsepal of the flower is pinched, giving it an immediately identifiable feature. In nature it is found near the locale where *D. lasiocampa* was first discovered, and the plants and flowers of both species are quite similar. Like most of the species of this genus, *D. portillae* can grow into a wonderful and attractive specimen, especially appealing when in full bloom. Flowering is frequent in cultivation, and blooms may appear in any month.

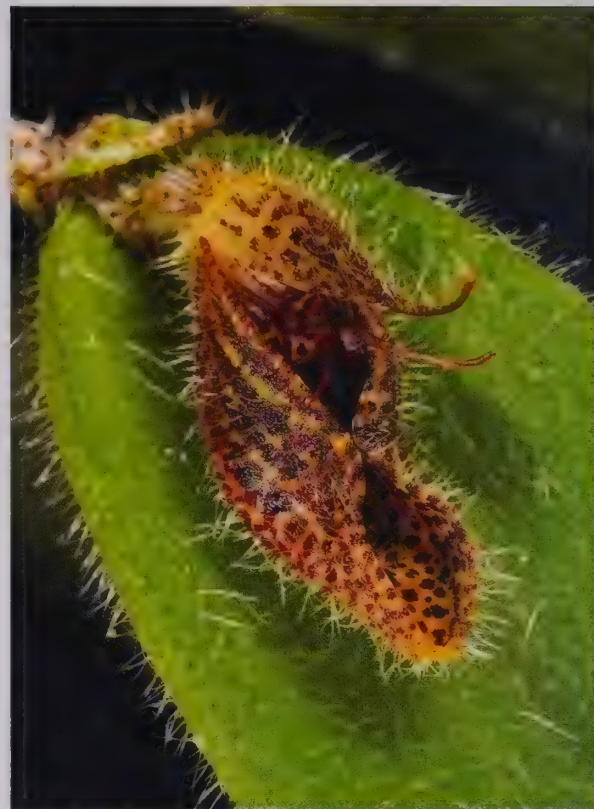


Figure 4.556 (above) The characteristically pinched flower of *Dresslerella portillae* (Grower: Steve Beckendorf).

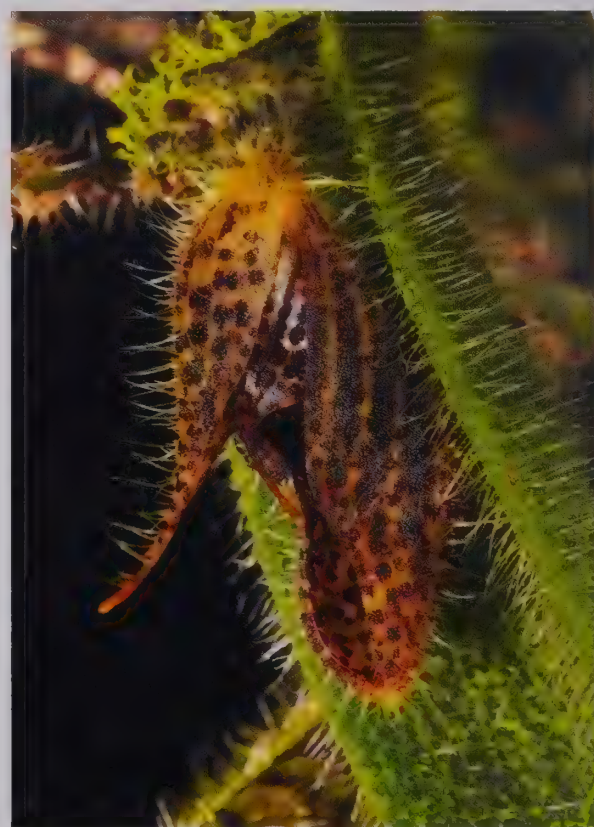


Figure 4.557 (above) The leaf and flower of *Dresslerella portillae* are a remarkable pair (Grower: Steve Beckendorf).

Dryadella Luer

Publication: Luer, C. A., 1978, *Selbyana* 2: 207

Subfamily: Epidendroideae
Tribe: Epidendreae
Subtribe: Pleurothallidinae

Type species: *Dryadella elata* (Luer) Luer, 1978, *Selbyana* 2: 208.

Heterotypic synonym: *Trigonanthe* (Schltr.) Brieger nom. inval.

Etymology: From the Greek *dryas* (wood nymph) and the Latin diminutive *-ella*, in reference to the diminutive size of the plants.

Profile: A genus of over 50 miniature species, ranging from Mexico and south through Central America to Venezuela, Peru and southern Brazil. *Dryadella* occur from lower elevations in humid forest through to cloud forest as high as 2600 m. Several of the species were originally described as *Masdevallia*, including the type.

General plant morphology: Sympodial, epiphytic or lithophytic, clumping, erect. *Ramicaul* short, erect, unifoliate. *Leaf* linear to narrowly elliptic to obovate, petiolate, leathery, fleshy. *Inflorescence* one to several flowered, floral bracts overlapping, from base of ramicaul. *Flower* Sepals ovate or triangular, connate at base to form cup, lateral sepals with transverse callus at base, petals small, angled, fleshy lip hinged to column foot by a basal claw with two auricles, pollinia 2.

General culture notes: *Substrate* mount on cork bark, rough-barked hardwood, small, rough wood shingles or tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. These plants may also be potted in moss or a fine bark mix. *Temperature* intermediate to cool, unless otherwise stated. *Light* bright to medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or by seed. *Fertilise* plants at 1/4 strength on a weekly basis. All species of *Dryadella*, in common with most pleurothallids, are prone to bean yellow mosaic virus (BYMV). Good aseptic technique should be used when repotting, and care should be taken to prevent aphid infestations as aphids are the vector for BYMV.



Figure 4.558 (above) *Dryadella guatemalensis* produces beautifully speckled leaves and flowers (Grower: Brad Cotten).

DRYADELLA***Dryadella albicans* (Luer) Luer****Publication:** *Selbyana* 2: 207 (1978)**Etymology:** From the Latin *albicans* (becoming white), referring to the slightly off-white flower colour.**Homotypic synonym:** *Masdevallia albicans* Luer.**Morphology:** Plant 3.6–7 cm tall, densely clumping, much branching, erect. *Ramicaul* 0.6–1 cm long, erect, enclosed in sheaths. *Leaf* 3–6 cm long by 2–3 mm wide, gradually tapering towards base, narrowly linear and becoming semi-terete, apex acute, lamina erect. *Inflorescence* a raceme, peduncle 0.5 cm long, borne from low on ramicaul. *Flower* 1–1.2 cm in diameter, few in number, singly successive, resupinate, spreading widely, hooded dorsal sepal, pedicel to 1 cm.**Range, elevation and habitat:** *Dryadella albicans* is known to occur in southern Ecuador (province of Azuay, 2000 m). There is also a collection record from Costa Rica (province of Osa, 400–1000 m), but this is likely to have been misidentified. This species blooms from October to November in nature. Conservation status unknown.**Culture recommendations:** See general guidance for the genus.**Comments:** Once considered a species of *Masdevallia*, *Dryadella albicans* is one of the loveliest members of this genus. It has plentiful, creamy-white flowers that contrast beautifully with the green foliage, and the blooms are some of the few lighter-coloured ones amongst *Dryadella*. This relatively obtainable and easy to grow species is a particularly rewarding addition to any collection given its tendency to mass bloom. It usually flowers during the winter months in cultivation.**Figure 4.559 (above)** A trio of lovely *Dryadella albicans* blooms (Grower: Russ Varnado).**Figure 4.560 (above)** *Dryadella albicans* is easy to grow and flowers plentifully (Grower: Marni Turkel).

DRYADELLA

Dryadella aurea Luer & Hirtz

Publication: *Monogr. Syst. Bot. Missouri Bot. Gard.* 76: 159 (1999)

Etymology: From the Latin *aureus* (golden) in reference to the flowers.

Morphology: *Plant* 2.2–3.4 cm tall, clumping, densely branching, erect. *Ramicauls*: 2–4 mm long, erect, enclosed in sheaths. *Leaf* 2–3 cm long by 0.3–0.35 cm wide, gradually tapering to base, narrowly linear-obovate, apex acute, lamina erect, leathery. *Inflorescence* congested raceme, peduncle less than 1 mm, from low on ramicaul. *Flower* 0.7–0.8 cm tall, few in number, successive, a single flower opening at a time, resupinate, spreading widely, hooded dorsal sepal, pedicel 0.2 cm.

Range, elevation and habitat: *Dryadella aurea* occurs in the Cordillera del Cutucú of southeastern Ecuador, in the Province of Morona-Santiago, at an elevation of 950 m, and in northeastern Peru, in the Department of Pasco, 700 m. This species tends to bloom from October to January in nature. Conservation status unknown.

Culture recommendations: See general guidance for the genus. *Temperature* intermediate.

Comments: The attractive, uniformly golden-orange flowers are unique within the genus, but unfortunately *Dryadella aurea* is rarely seen in cultivation. This species, in common with most *Dryadella*, is easy to grow, and plants form attractive, tufted clumps relatively quickly, often blooming with a multitude of flowers. Those growing this species are encouraged to propagate it by seed or division in order to increase its availability. *Dryadella aurea* tends to bloom in autumn in cultivation.



Figure 4.561 (above) The golden flower of the aptly named *Dryadella aurea* (Grower: Gerardus Staal).



Figure 4.562 (above) *Dryadella aurea* has fine flowers, but is rarely seen in cultivation (Grower: Mary Gerritsen).

DRYADELLA

Dryadella cristata Luer & R. Escobar

Publication: *Orquideologia* 15: 126 (1982)

Etymology: From the Latin *cristatus* (crested), referring to the crested midvein of the petals.

Morphology: *Plant* 2.4–5 cm, densely clumping, much branched, erect. *Ramicaul* 6–12 mm long, erect, enclosed in sheaths. *Leaf* 1.8–5 cm long by 0.4–0.6 cm wide, gradually tapering to base, narrowly elliptical, apex sub-acute, lamina erect, thickly leathery. *Inflorescence* a congested raceme, 3 mm peduncle, enclosed in sheath, emerging from near base of ramicaul. *Flower* 1.5 cm tall, few in number, successive, a single flower opening at a time, resupinate, spreading widely.

Range, elevation and habitat: *Dryadella cristata* occurs in southern Colombia in the Department of Valle del Cauca. It grows in cloud forest. No elevational range, bloom-time or conservation status data are known.

Culture recommendations: See general guidance for the genus.

Comments: *Dryadella cristata* is a wonderful species with proportionately large, colourful and beautifully marked flowers. It is occasionally available, easy to grow and a reliable bloomer. The petal tips of *D. cristata* are quite extraordinary, resembling charred, melted plastic! Highly recommended, *D. cristata* blooms from mid-winter to early spring in cultivation.

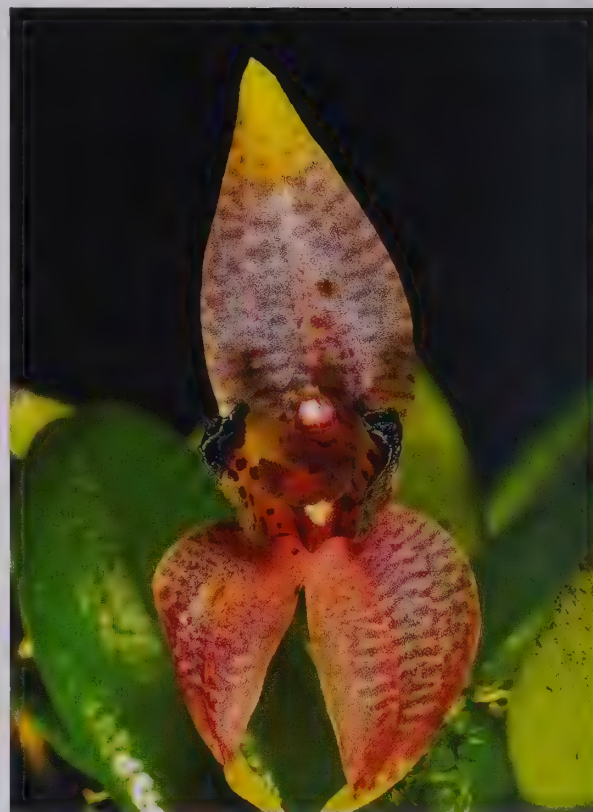


Figure 4.563 (above) *Dryadella cristata* has substantial, colourful, extraordinary flowers (Grower: Brad Cotten).

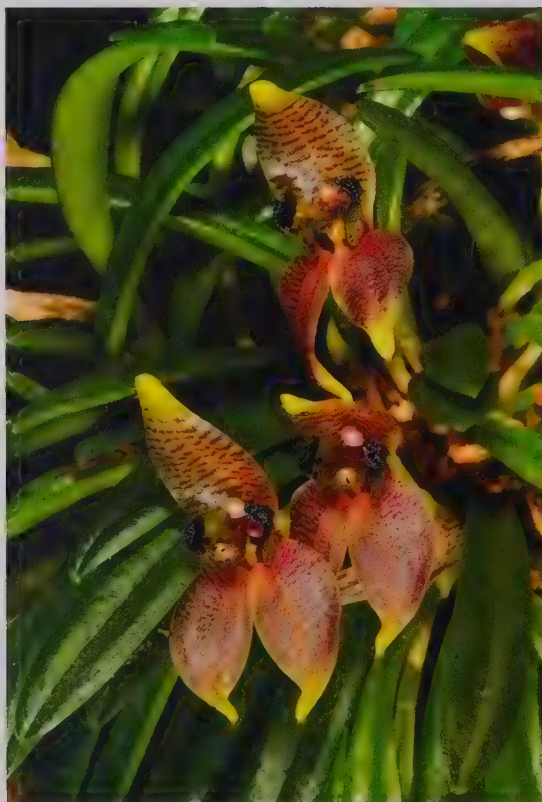


Figure 4.564 (above) *Dryadella cristata* blooms contrast beautifully with its dark leaves (Grower: Marni Turkel).



Figure 4.565 (above) *Dryadella cristata* flowers freely during winter to spring (Grower: Marni Turkel).

DRYADELLA

Dryadella edwallii (Cogn.) Luer

Publication: *Selbyana* 2: 208 (1978)

Etymology: Named in honour of Gustav Edwall (1862–1946), who discovered this species.

Homotypic synonym: *Masdevallia edwallii* Cogn.

Morphology: *Plant* 3–6 cm, densely clumping, much branching, erect. *Ramicaul* 0.5–1.4 cm long, erect, enclosed in sheaths. *Leaf* 2.5–5 cm long by 0.3–0.7 mm wide, subpetiolate, linear-elliptical, apex sub-acute, lamina erect, thickly leathery, often suffused with purple. *Inflorescence* a congested raceme, peduncle 3–4 mm, borne from near apex of ramicaul on most recent growths. *Flower* 2–2.5 cm wide, few in number, successive, a single flower opening at a time, resupinate, spreading widely, hooded dorsal sepal, pedicels 1.5–2.5 cm.

Range, elevation and habitat: *Dryadella edwallii* is found in southern Brazil in the states of Rio de Janeiro, São Paulo, Paraná and Santa Catarina, at elevations of 350–1800 m. It is locally common and grows epiphytically or lithophytically in very humid primary forest on tree trunks, large branches, shrubs and rocks. This species blooms between October and February in nature.

Culture recommendations: See general guidance for the genus.

Comments: *Dryadella edwallii* is another species that was initially placed within *Masdevallia* by taxonomists. This lovely species is commonly available, easy to grow, adaptable, delightful, floriferous, and has proportionately large flowers. Its closest relative, *D. zebrina*, is a very similar species, differing primarily by the transverse barring of the dorsal sepal. Another difference, although one that is hard to see, is that the lip of *D. edwallii* is approximately 1 mm longer and wider. It is possible that the two taxa may simply prove to be varieties of one species. The lovely flowers usually bloom between late winter and late spring.



Figure 4.566 (above) The yellow flowers of *Dryadella edwallii* are spectacularly punctuated with red pigment throughout (Grower: Marni Turkel).

Figure 4.567 (overleaf) The similar *Dryadella zebrina* differs in having transverse barring on its dorsal sepals (Grower: Mary Gerritsen).



DRYADELLA***Dryadella lilliputiana* (Cogn.) Luer****Publication:** *Selbyana* 2: 208 (1978)**Etymology:** Named for the diminutive kingdom of *Lilliput* in Jonathan Swift's novel, *Gulliver's Travels*.**Homotypic synonym:** *Masdevallia lilliputiana* Cogn.**Heterotypic synonyms:** *Masdevallia paranaensis* Schltr., *Masdevallia melloi* Pabst, *Dryadella melloi* (Pabst) Luer, *Dryadella paranaensis* (Schltr.) Luer.**Morphology:** Plant 1.5–3.5 cm, densely clumping, much branched, erect. Ramicaul 0.2–0.6 cm long, erect, enclosed in sheaths. Leaf 1–3 cm long by 2.5–3 mm wide, ovoid-fusiform to semi-terete, apex acute, apiculate, lamina channelled on dorsal side, erect, thickly fleshy, leathery, speckled with purple, minutely dimpled. Inflorescence a congested raceme, peduncle 0.2–0.4 cm, sheathed, from low on ramicaul. Flower to 1 cm tall, few in number, successive, a single flower opening at a time, resupinate, flowers variable in density of spotting and length of sepaline tails.**Range, elevation and habitat:** *Dryadella lilliputiana* occurs in southern Brazil (states of Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul) and Bolivia (department of La Paz) at elevations ranging from 700–1700 m. Conservation status unknown.**Culture recommendations:** See general guidance for the genus.**Comments:** When seeing the attractive flowers of *Dryadella lilliputiana* for the first time, it is easy to understand how the species was first classified as a *Masdevallia*; indeed, the long, slender sepaline tails and spotted, creamy white flowers look more like a *Masdevallia* than a *Dryadella*. This species also has a handsome plant form, with thick, succulent-looking leaves that are sometimes tinged with pink. *Dryadella lilliputiana* is relatively available and fairly easy to cultivate, but care must be taken not to overwater this fleshy plant, as rot may set in. It is perhaps best to grow this species on a mount. In cultivation, flowers have been recorded in early summer and mid-winter**Figure 4.568 (above)** A handsome clump of *Dryadella lilliputiana* flowering on a mount (Grower: Steve Beckendorf).**Figure 4.569 (above)** *Dryadella lilliputiana* blooms are reminiscent of *Masdevallia* (Grower: Mary Gerritsen).

Drymoda Lindl.

Publication: Lindley, J., 1838, *Sert. Orchid.*: t. 8 C

Subfamily: Epidendroideae

Tribe: Podochileae

Subtribe: Bulbophyllinae

Type species: *Drymoda picta* Lindl., 1838, *Sert. Orchid.*: t. 8 C.

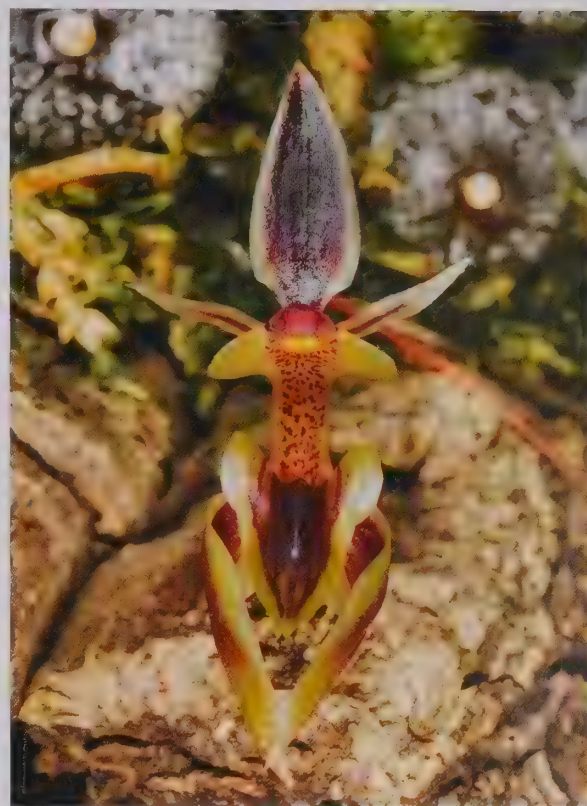
Etymology: From the Greek *drumodes* (forest), referring to the habitat of the plants.

Profile: A genus of 3 recognised species found in Laos, Myanmar, Thailand and New Guinea.

General plant morphology: Sympodial, epiphytic, unifoliate. *Inflorescence* a single flowered raceme. *Flower* short column with spreading wings, lateral sepals attached to end of long column foot, pollinia 4.



Figure 4.570 (above) Plants of *Drymoda siamensis* handsomely festoon the face of a rocky outcrop in Thailand (Photo: Hendrik Jacobs).

DRYMODA***Drymoda siamensis*** Schltr.**Publication:** *Repert. Spec. Nov. Regni Veg.* 2: 170 (1906)**Etymology:** The toponym *Siam* (Thailand) plus the Latin suffix *-ensis* (of, from), meaning from Thailand.**Morphology:** *Plant* to 3.5 cm tall, branching, mat-forming, pseudobulbs arranged in irregular rows, branching, closely set. *Pseudobulb* to 1 cm tall by 1.1 cm wide, dorsally flattened and disc-like, irregularly shaped, wrinkled, covered in papery bracts, leaves opposite, apical, bifoliate, but occasionally 3 in number, quickly deciduous. *Leaf* to 3 cm long by 1.5 cm wide, sessile, ovate elliptic, apex obtuse, lamina suberect to spreading, arcuate, soft, thin textured, flexible. *Inflorescence* a raceme, 2–5 cm long, abbreviated peduncle with long pedicillate ovary, suberect to erect, filiform, borne laterally from base of deciduous pseudobulb. *Flower* 1.5–1.8 cm tall, single, resupinate, spreading, flowers upward-facing, narrow segments, petals finely serrated.**Range, elevation and habitat:** *Drymoda siamensis* grows as an epiphyte or lithophyte in Myanmar, northern Thailand, Laos and Vietnam at elevations of 600–1000 m, where it is locally common. It occurs in lower montane seasonal forest. In Thailand this species blooms in February and March, prior to the wet season.**Culture recommendations:** *Substrate* mount vertically or horizontally on a piece of cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using little or no New Zealand *Sphagnum* moss. This species is not well suited to potted culture due to its creeping habit and seasonal deciduous nature. *Temperature* intermediate. This species requires a cooler period during its winter dormancy. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet during growing season. Reduce water in the autumn, or as pseudobulbs mature, with infrequent misting of roots during the winter dormancy once plants have dropped their leaves. Keep water off buds and flowers, lest damping-off occur. *Humidity* high during growth, average during dormancy. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly during active growth, but omit during dormancy.**Comments:** *Drymoda siamensis* appears to be the only species in the genus that is cultivated with any frequency. The unusually shaped flowers are quite striking, appearing alongside the strange, depressed dormant pseudobulb, but standing erect, and orientated straight up. Not common in collections, possibly because some growers find it difficult to keep alive, *Drymoda siamensis* has a distinct dormancy period that should be closely followed for success. The proportionately large flowers tend to occur from late winter to mid-spring in cultivation.**Figure 4.571 (above)** The striking and unusual flower of *Drymoda siamensis* (Grower: Howard Gunn).**Figure 4.572 (above)** *Drymoda siamensis* flowers seen here in profile (Photo: Hendrik Jacobs).

Epidendrum L.

Publication: Linnaeus, C., 1769, *Sp. Pl. ed. 2*: 1347 (1763)

Subfamily: Epidendroideae

Tribe: Epidendreae

Subtribe: Laeliinae

Type species: *Epidendrum nocturnum* Jacq., 1760, *Enum. Syst. Pl.*: 29.

Etymology: From the Greek *epi* (upon) and *dendron* (tree), referring to the epiphytic habit of most of the species.

Heterotypic synonyms: *Amblostoma* Scheidw., *Amphiglottis* Salisb., *Anocheile* Hoffmanns. ex Rchb., *Auliza* Salisb., *Coilostylis* Raf., *Didothion* Raf., *Diothonea* Lindl., *Epidanthus* L.O.Williams, *Epidendropsis* Garay & Dunst., *Exophya* Raf., *Gastropodium* Lindl., *Hemiscleria* Lindl., *Kalopternix* Garay & Dunst., *Lanium* (Lindl.) Benth., *Larnandra* Raf., *Minicolumna* Brieger, *Nanodes* Lindl., *Neolehmannia* Kraenzl., *Neowilliamsia* Garay, *Nyctosma* Raf., *Oerstedella* Rchb.f., *Phadrosanthus* Neck., *Physinga* Lindl., *Pleuranthium* (Rchb.f.) Benth., *Pseudepidendrum* Rchb.f., *Psilanthemum* (Klotzsch) Stein, *Seraphyta* Fisch. & C.A.Mey., *Spathiger* Small, *Spathium* Stein, *Stenoglossum* Kunth, *Takulumena* Szlach, *Tritelandra* Raf.

Profile: One of the largest orchid genera, with nearly 1400 species. Species include epiphytes, lithophytes and terrestrials from the southeast United States, Mexico through Central and South America to northern Argentina, and the Caribbean. Habitats range from sea level to over 3000 m elevation.

General plant morphology: Sympodial, rarely monopodial, erect to pendent. *Pseudobulb* usually cane-like stems, sometimes thickened to spindle shaped, some pseudobulbous, leaves distichous, sheathing at base. *Leaf* shape extremely variable. *Inflorescence* raceme or panicle, apical, lateral or, rarely, basal. *Flower* sepals subequal, usually free, petals often narrower than sepals, lip usually joined to sides of the column forming a nectar tube, blade free, entire or trilobed, pollinia 2 or 4.



Figure 4.573 (above) A mounted clump of *Epidendrum nanum* in full bloom (Grower: Hanging Gardens).

EPIDENDRUM***Epidendrum avicula* Lindl.****Publication:** *J. Bot. (Hooker)* 3: 85 (1841)**Etymology:** From the Latin *aviculum* (small birds), referring to the appearance of the flowers.**Homotypic synonym:** *Lanium avicula* (Lindl.) Benth.**Heterotypic synonyms:** *Lanium avicula* var. *longifolia* Cogn., *Lanium avicula* var. *subteretifolia* Hoehne, *Lanium ecuadorens* Schltr.**Morphology:** Plant to 10 cm tall, creeping, branching, mat-forming, pseudobulbs spaced to 4 cm along rhizome. *Pseudobulb* to 3.8 cm tall by 1.7 cm wide, fusiform to narrowly oblong, erect, leaves 2–3, opposite, apical. *Leaf* to 6.5 cm long by 2 cm wide, clasping at base, oblong to ovate to nearly orbicular, apex acute to rounded, lamina leathery, rigid. *Inflorescence* a raceme, occasionally paniculate, to 15 cm long, erect, slender, green to reddish, woolly pubescent, fractiflex, small subtending bracts, terminal. *Flower* 1–1.5 cm in diameter, 3 to many, simultaneous, non-resupinate, widely spreading to somewhat reflexed, pedicel, ovary and exterior of sepals hirsute.**Range, elevation and habitat:** A widespread and relatively common species, *Epidendrum avicula* is found in the Amazonian regions of Ecuador (provinces of Chimborazo, Loja, Morona-Santiago, Pastaza, and Zamora-Chinchipe), Peru (departments of Junin and Pasco) and Bolivia (departments of La Paz and Santa Cruz). In Brazil it occurs in the Caatinga, Cerrado and Mata Atlântica phytogeographic regions in the states of Ceará, Pernambuco, Mato Grosso, Goiás, Distrito Federal, Minas Gerais, Espírito Santo, São Paulo, Rio de Janeiro, Paraná, Santa Catarina and Rio Grande do Sul. This species occurs over a range of elevations (500–1800 m). Plants in Peru bloom between February and March, but in other parts of its range, this species blooms between March and April or September and November.**Culture recommendations:** *Substrate* best mounted horizontally on large cork plaques, wood shingles or tree fern plaques, using New Zealand *Sphagnum* moss around the roots. This species may also be potted in large, shallow, bulb-type pans, bonsai pots or baskets with moss or a fine bark mix. The species has a rambling habit. *Temperature* intermediate to intermediate-cool. *Light* bright shade to medium shade. *Watering* moist, well drained, not wet, but may be allowed to dry briefly between watering without harm. In winter, it is best to reduce the frequency of waterings. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.**Comments:** *Epidendrum avicula* is relatively common and easy to grow. The non-resupinate (lip uppermost) flowers have been likened by many**Figure 4.574 (above)** The slender inflorescence of *Epidendrum avicula* flowering in cultivation (Grower: J & L Orchids).**Figure 4.575 (above)** The flowers of *Epidendrum avicula* in detail. Note the long pedicels (Grower: J & L Orchids).

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to birds in flight, accounting for the specific name. It is still frequently labelled in collections as *Lanum avicula*. *Epidendrum avicula* has a few close relatives, *E. berkeleyi* (Rolfe) Baptista, *E. microphyllum* Lindl. and *E. stilliferum* Dressler. The plant habit of *E. avicula* is quite attractive, although one must allow room for growth due to the elongation of the rhizome between pseudobulbs. In cultivation this species generally blooms in the summer or autumn months.

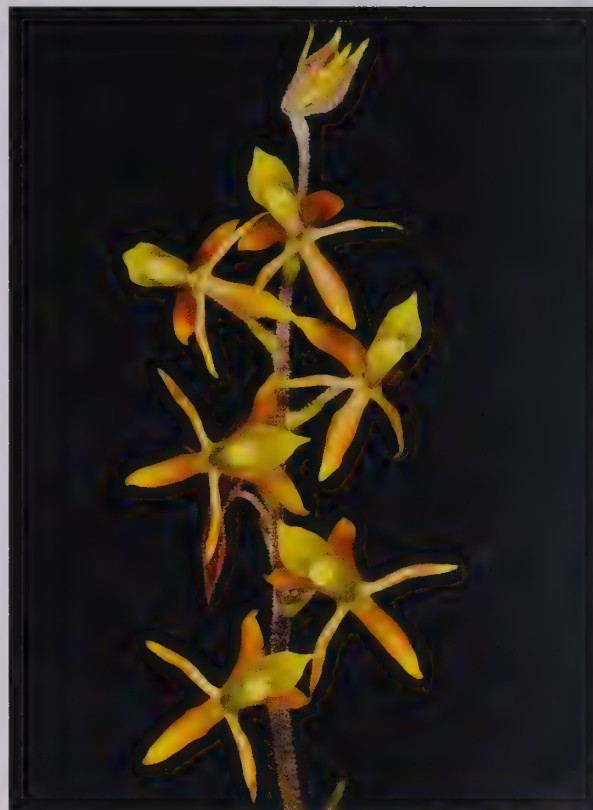


Figure 4.576 (right) The attractive flowers of *Epidendrum avicula*. Note the difference in pedicel length with those in the previous two images, which may indicate that they are different taxa (Grower: Judy Carney).



Figure 4.577 (above) *Epidendrum avicula* growing wild as a trunk epiphyte in Brazil (Photo: Rafael Bortoloti).

EPIDENDRUM***Epidendrum frechetteanum*** D.E.Benn. & Christenson**Publication:** *Icon. Orchid. Peruv.*: t. 637 (2001)**Etymology:** Honouring James E. Frechette, master horticulturist, for his work in the Peru Flora project.**Morphology:** *Plant* to 6 cm, creeping, slowly ascending, new stem originating up to 2 cm above base of previous growth, branching. *Stem* 1.2–3 cm tall by up to 1 cm wide, rounder in lower part, laterally compressed in upper half, obscured by bracts, leaves 1–2, occasionally 3, opposite, terminal. *Leaf* to 6 cm long by up to 3 cm wide, proportionately large, sessile, folded at base, oblong-elliptic, apex obtuse, apiculate, lamina spreading, slightly flexible, leathery, rugulose, suffused with reddish purple underneath. *Inflorescence* a raceme, extremely abbreviated, from terminal sheath. *Flower* to 3.5 cm tall, proportionately large, to 3 in number, simultaneous, resupinate, widely spreading. Flowers vary from pinkish-green to maroon.**Range, elevation and habitat:** A relatively recently discovered species, *Epidendrum frechetteanum* is known only from the department of Huacavelica in highland central Peru. It occurs in wet, cool to cold montane cloud forest at elevations of 1650–2400 m. It grows as an epiphyte low on the trunks and undersides of branches on small trees. Plants bloom between January and March in nature. This species is listed as endangered on the IUCN Red List.**Culture recommendations:** *Substrate* mounted on cork bark, rough-barked hardwood or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species may also be grown potted in small pots, bulb pans or baskets, using moss or fine bark mix. *Temperature* cool to cold. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. This rare species should be propagated whenever possible. *Fertilise* at 1/4 to 1/2 strength weekly.**Comments:** *Epidendrum frechetteanum* is rare in collections and highly desirable. The thick-textured flowers are fully spreading with a glossy sheen, ranging in colour from maroon to pinkish green. Somewhat slow growing, the plants have an unusual, stepped growth habit in which the newest pseudobulb emerges part way up the previous one. This species blooms between autumn and winter in cultivation.**Figure 4.578 (above)** *Epidendrum frechetteanum* produces fleshy looking flowers (Grower: Marni Turkel).**Figure 4.579 (above)** A pair of *Epidendrum frechetteanum* blooms (Grower: Marni Turkel).

EPIDENDRUM

Epidendrum longipetalum A.Rich. & Galeotti

Publication: *Ann. Sci. Nat., Bot.*, III 22 (1845)

Etymology: From the Latin *longus* (long) and *petalum* (petal), referring to the long petals.

Heterotypic synonym: *Epidendrum antenniferum* Lindl. & Paxton, nom. illeg.

Morphology: *Plant* 2–9 cm tall, creeping, branching, clumping, erect. *Stem* cane-like, slender at base, distally wider and laterally compressed, leaves distichous, near apex, 2–3 in number. *Leaf* to 8 cm long by up to 3 cm wide, proportionately large, broadly oval-elliptic to ovate, apex obtuse to acute, lamina spreading, leathery, rigid, often suffused with purple. *Inflorescence* congested raceme, to 75 cm long, with long persistent peduncle, new racemes formed annually, distally, for several seasons from same peduncle, sheathed at nodes along length, erect to suberect, slender, terminal. *Flower* 4–5 cm tall, to 20 in number, successive, resupinate, widely spreading, slender, petals proportionately long, downward pointing. Flowers vary from greenish to reddish to pinkish to bronze.

Range, elevation and habitat: *Epidendrum longipetalum* is a locally common endemic of Mexico, where it grows as an epiphyte, occasionally as a lithophyte, in the evergreen cloud forests of the Sierra Madre del Sur and the Sierra Madre Oriental. It occurs at elevations of 1750–2600 m in the states of Hidalgo, Puebla, Veracruz and Oaxaca. Inflorescences of this species initiate in late winter, but flowering occurs throughout the year.

Culture recommendations: *Substrate* pot in a medium bark mix, or mount on cork bark, rough-barked hardwood, rough wood shingles or tree fern, using little or no New Zealand *Sphagnum* moss. *Temperature* intermediate cool to cool. *Light* bright diffuse to bright shade. *Watering* water from May to November, keep moist well drained, not wet, possibly drying briefly between watering. When canes mature, or in mid-autumn, reduce frequency of waterings. From late autumn to mid-spring, water lightly or mist every 10–14 days. *Humidity* high during the growing season, average (50–60 %) during dormancy. *Air movement* brisk. *Propagation* by division or seed. *Fertilise* at 1/2 strength during growing season, but withhold fertiliser during winter dormancy. Do not cut off the flower spikes of this species as they will re-bloom for many seasons.

Comments: Certainly a curious species, *Epidendrum longipetalum* has flowers with long, spirally-twisted petals that hang down in an unusual posture. Proportionately, they are some of the longest in the orchid family. The inflorescences are also quite long, successively blooming, and last for approximately three years! Do not cut the spikes until they have dried out. A similar and related species, *Epidendrum tortipetalum*, has a somewhat larger plant, but the flowers have shorter petals and a differently shaped lip.



Figure 4.580 (above) The truly long-petalled *Epidendrum longipetalum* (Grower: Ginette Sanchou).



Figure 4.581 (above) Varieties of *Epidendrum longipetalum* produce flowers of different colours (Grower: Dennis Olivas).

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Epidendrum longipetalum grows well outdoors in milder temperate climates, such as coastal California, under conditions appropriate for *Cymbidium* and Mexican *Laelia*.

In common with these other genera, the plants must be protected from freezing temperatures. In cultivation, *E. longipetalum* flowers mostly during the summer, but it may also bloom occasionally at other times.



Figure 4.582 (above left) The flower of the related *Epidendrum tortipetalum* (Grower: Dennis Szeszko).



Figure 4.583 (above right) *Epidendrum tortipetalum* photographed *in situ* in Mexico state, 2400 m elevation, in cool, moist oak pine forest near a mountain stream (Photo: Dennis Szeszko).

EPIDENDRUM

Epidendrum miserum Lindl.

Publication: Edwards's Bot. Reg. 27 (Misc.): 37 (1841)

Etymology: From the Latin *miserum* (wretched, insignificant) possibly referring to the tiny flowers or the small stature of the plant.

Homotypic synonym: *Hormidium miserum* (Lindl.) Benth. & Hook.f. ex Hemsl.

Heterotypic synonym: *Epidendrum pulchellum* A.Rich. & Galeotti.

Morphology: Plant 1.5–6.5 cm tall in leaf, clustered, branching, slowly creeping. *Pseudobulb* 1–1.5 cm tall by 1 cm wide, sub-orbicular, orbicular, conico-ovoid or oblong, apex sometimes nearly truncate, slightly compressed laterally, covered by papery sheaths, wrinkled at end of dry season or when old, leaves 2 in number, with 1 basal leaf-like bract, apical, opposite, deciduous for about 6 months. *Leaf* to 6 cm long by 1.2 cm wide, subpetiolate, folded at base, oblong to narrowly oblong to narrowly ovate, apex acute, lamina suberect to spreading, thinly leathery, flexible. *Inflorescence* a raceme, 1–4 cm long, erect, borne from deciduous pseudobulbs before new growths initiate, terminal. *Flower* 0.6–0.8 cm tall, 2–6 in number, simultaneous, resupinate, but flowers randomly orientated, upward-facing, widely spreading, mildly fragrant. Flowers vary in colour from reddish brown to pinkish to chocolate brown.

Range, elevation and habitat: *Epidendrum miserum*, a locally common Mexican endemic, grows in the states of Guerrero, Jalisco, México, Michoacán, Morelos and Oaxaca at elevations of 1300–2000 m, occasionally higher. It occurs as an epiphyte or lithophyte and is often found amongst lichens, fern roots and humus on branches and tree trunks, as well as on rocks and ravines in pine and oak forest. The plants are quite difficult to spot when leafless. This species is also found in seasonally very dry, deciduous oak forest, often on steep slopes, occasionally on volcanoes. It was studied by the authors in México state in late April, at the end of the dry season, on dried moss and lichen-covered, horizontal branches, where it grew with young plants of *Prosthechea citrina*. Plants in nature bloom between January and February.

Culture recommendations: *Substrate* mount on cork, bark, rough-barked hardwood or small rough wood shingles, probably not on tree fern. It is not well-suited to potted culture. *Temperature* intermediate to intermediate-cool. *Light* bright diffuse to bright shade. *Watering* from mid-spring to mid-autumn, water frequently, but keep well drained, not wet. In mid to late autumn, when the pseudobulbs mature and leaves begin to yellow, reduce watering frequency. During the dry season or winter dormancy, when leaves have fallen, mist the roots every 14 days or so, ideally on sunny days. *Humidity* high during the growing season, average (50–60 %) during dormancy. *Air movement* good to brisk. *Propagation* by



Figure 4.584 (above) Flowers of *Epidendrum miserum* in detail (Grower: Ron Parsons).



Figure 4.585 (above) A flowering specimen of *Epidendrum miserum* mounted on cork bark (Grower: Ron Parsons).

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division or seed. *Fertilise* at 1/4 strength during growing season, but withhold fertiliser during winter dormancy period to discourage premature growths.

Comments: Although one of the tiniest of the *Epidendrum*, particularly when the leaves have dropped, the unflattering specific epithet is hardly representative. While the plant may be small, with somewhat cryptic little flowers, it is a gem amongst orchids. The subtly yet pleasingly fragrant clusters of flowers sit above the leafless pseudobulbs, lasting a surprisingly long time, up to as many as four weeks. Moreover, it is a tough little plant, tolerating dry conditions for up to six months in nature. In cultivation it blooms between late winter and mid-spring, just before watering recommences and the pseudobulbs sprout their new growth.



Figure 4.586 (above) A profile of the pseudobulbs and flowers of *Epidendrum miserum*, showing the rather short form of the inflorescence (Grower: Ron Parsons).

EPIDENDRUM

Epidendrum nanum C.Schweinf.

Publication: *Bot. Mus. Leaf.* 11: 102 (1943)

Etymology: From the Greek *nanos* (dwarf), possibly referring to the small plant and or flowers.

Morphology: *Plant* individual growths to 8 cm, slowly creeping, clumping, branching, mat-forming, layered, descending to pendent. *Stem* obscured by leaves, leaves many, distichous, imbricated. *Leaf* to 2 cm long by up to 0.4 cm wide, folded at base, lanceolate to ovate-acuminate, apex acute, apiculate, lamina spreading, fleshy. *Inflorescence* congested raceme, much abbreviated, subsessile, flowers subtended by 2 bracts, terminal. *Flower* 0.8–1 cm in diameter, proportionately large, 1–3 in number, simultaneous, resupinate, widely spreading.

Range, elevation and habitat: *Epidendrum nanum* is an epiphytic species that occurs in Ecuador (provinces of Loja, Morona Santiago, Napo, Pastaza, Tungurahua and Zamora-Chinchipe, 600–2250 m), Peru (departments of Cuzco, Junin and San Martin, 1400–1800 m) and Bolivia (department of Cochabamba, 1150 m), where it grows in dense, lower wet montane forest and humid tall forest. In Peru plants bloom between September and October, and between February and March. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, wood shingles or possibly tree fern. This species is not well suited to potted culture due to the descending to pendent nature of the plant. *Temperature* intermediate to cool. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. Plants may be allowed to dry slightly between waterings. This species does not undergo a rest period. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. This uncommon species should be propagated where possible. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Epidendrum nanum* is not commonly seen in collections, but has many charms. The starry, slightly fragrant little flowers cluster at the apex of the stem, nestled tightly on short pedicels. A lovely species, particularly when it reaches specimen size, the attractive, descending, leafy stems grow tightly together, appearing almost layered. This species generally flowers between autumn and spring in cultivation.



Figure 4.587 (above) The pale flowers of *Epidendrum nanum* in detail (Grower: Brad Cotten).



Figure 4.588 (above) *Epidendrum nanum* flowers subtly flushed with pinkish-red pigment (Grower: Brad Cotten).

EPIDENDRUM

Epidendrum peperomia Rchb.f.

Publication: *Bonplandia* (Hannover) 2: 20 (1854)

Etymology: Like a *Peperomia*, a large genus in the Piperaceae.

Homotypic synonym: *Neolehmannia peperomia* (Rchb.f.) Garay & Dunst.

Heterotypic synonyms: *Epidendrum porpax* Rchb.f., *Epidendrum lambeauanum* De Wild., *Epidendrum gnomus* Schltr., *Epidendrum porphyrophyllum* Schltr., *Neolehmannia porpax* (Rchb.f.) Garay & Dunst., *Nanodes porpax* (Rchb.f.) Brieger & Lückel.

Morphology: *Plant* individual growths 4–8 cm long, creeping, freely branching, mat-forming, growths often layered. *Stem* ascending to pendent, obscured by leaf bases, leaves imbricate, distichous. *Leaf* 1.2–3 cm long by 0.4–0.9 cm wide, elliptic-linear, ligulate, lanceolate-ovate to oblong-lanceolate, falcate, apex acute to obtuse, mucronate or obliquely retuse, lamina fleshy, leathery. *Inflorescence* a raceme, much abbreviated, pedicellate ovary 1.5–2.5 cm long, terminal. *Flower* to 2.5 cm long, proportionately large, 1, rarely 2, in number, simultaneous, resupinate, widely spreading, lip convex, shiny, proportionately large.

Range, elevation and habitat: *Epidendrum peperomia* is a widespread and common species, ranging from Mexico south to Panama, and in South America from Colombia east to Venezuela and south to Bolivia. It occurs at elevations up to 2500 m, growing as an epiphyte in humid montane pine forest, oak forest or in cloud forest, where it forms large mats on vertical trunks. In Mexico it may be found on twigs at the crowns of trees in cloud forests. It blooms between September and January in most localities, but in Venezuela it is reported to bloom in almost any month.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern. This species is not well suited to potted culture due to its descending, layered plant habit. *Temperature* warm to cool, depending on plant provenance. If unsure, grow in intermediate conditions. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. May dry briefly without harm between waterings. This species does not undergo a rest period. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: Long known in collections under its synonym, *Epidendrum porpax*, *E. peperomia* remains an extremely popular species, and rightly so. It is easy to grow, forms specimen sized plants easily, is readily available, floriferous, and, to use an American idiom, “cute as a bug’s ear”! Indeed, the flowers are rather insect-like in their appearance, with narrow green petals and sepals that look somewhat like legs, and a large, shiny, convex, russet-coloured lip that resembles the carapace of a beetle. There is an

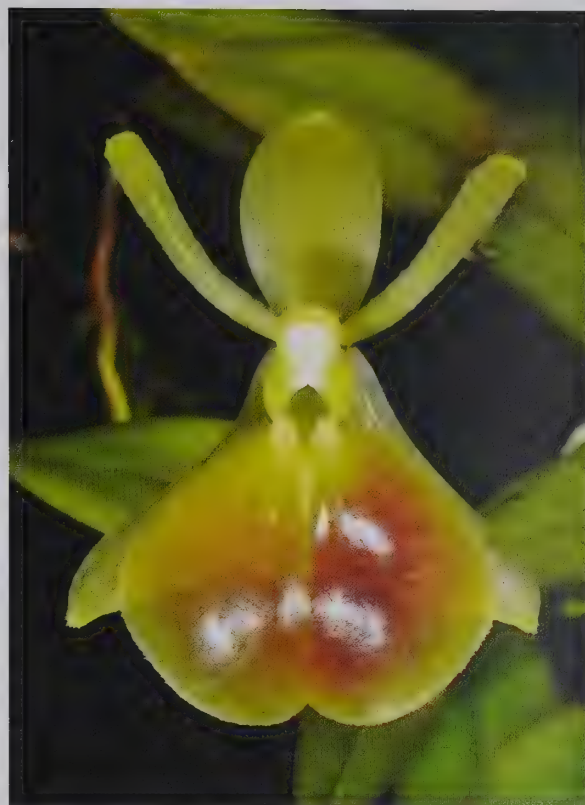


Figure 4.589 (above) A bicolor bloom of *Epidendrum peperomia* in detail (Grower: MarniTurkel).



Figure 4.590 (above) The similar flowers of this *Epidendrum mathewsii* are solid green in colour (Grower: Judy Carney).



EPIDENDRUM

entirely green-flowered form that is uncommonly seen, but just as desirable. Interestingly, the leaves of the latter form are more falcate in shape.

Epidendrum peperomia is quite widespread in nature and, as is typical of species with extensive ranges, is also quite variable. Some botanists regard the different forms as distinct species, whilst others place them within the range of single species variation. Two currently accepted relatives, *E. viridibrunneum* Rchb.f. and *E. vargasii* Christenson & Nauray, do appear to be distinct. *Epidendrum peperomia* tends to bloom between mid-summer and mid-winter in cultivation.

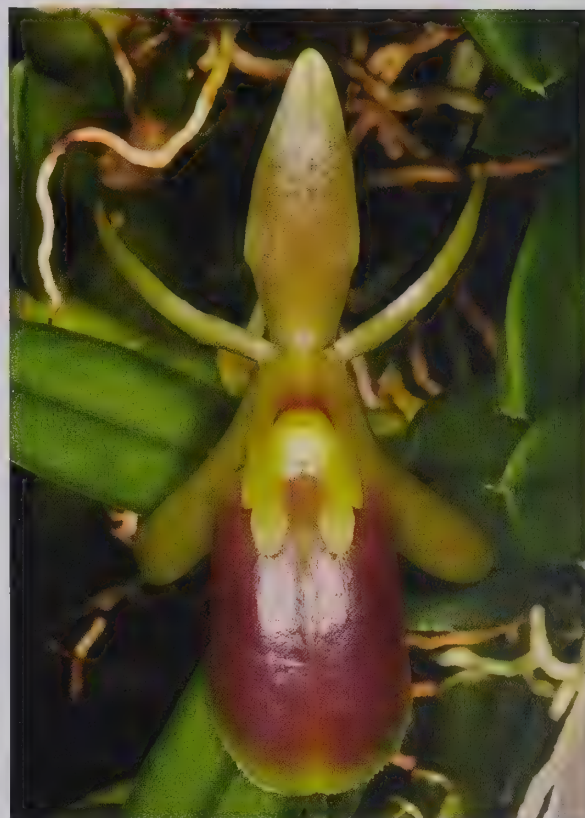


Figure 4.592 (above) The flower of *Epidendrum* cf. *peperomia* in detail (Grower: Hanging Gardens).



Figure 4.593 (above left) A bloom of *Epidendrum* aff. *peperomia* in detail (Grower: Marni Turkel).



Figure 4.594 (above right) *Epidendrum viridibrunneum* is a related, but nonetheless distinct taxon with cute little flowers (Grower: Marni Turkel).

EPIDENDRUM

Epidendrum schlechterianum Ames

Publication: *Schedul. Orchid.* 7: 9 (1924)

Etymology: Named for Friedrich Richard Rudolf Schlechter (1872–1925), German taxonomist, botanist and author of many works on orchids.

Homotypic synonyms: *Epidendrum brevicaule* Schltr., nom. illeg., *Nanodes schlechterianum* (Ames) Brieger.

Heterotypic synonyms: *Nanodes discolor* Lindl., *Epidendrum discolor* (Lindl.) Benth., nom. illeg.

Morphology: *Plant* individual growths to 10 cm long, slowly clumping, freely branching, mat-forming, layered. *Stem* to 10 cm tall, cane-like, laterally compressed, leaves numerous, crowded, densely imbricate, distichous, to 13 in number, obscuring stems. *Leaf* 1–3.2 cm long by 0.3–1.5 cm wide, non-articulate, ovate-oblong to narrowly lanceolate, apex obtuse irregularly dentate to erose, mucronate, lamina spreading, channelled, margins of leaves entire to minutely erose, hyaline, somewhat revolute to slightly recurved, fleshy, rigid, often suffused with purplish or reddish. *Inflorescence* a raceme, much abbreviated, subsessile, nestled within smaller, terminal leaves, terminal. *Flower* to 4 cm long, to 2 in number, simultaneous, resupinate, spreading widely, lip united to column, entire, base clavate, cordate-reniform, margin irregularly dentate, lacking callus or keels.

Range, elevation and habitat: The true *Epidendrum schlechterianum* is endemic to central Panama, where it is found in the provinces of Canal Area, Colón, Panamá, San Blas and Veraguas in low to relatively low tropical forest at elevations of 50–900 m. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using New Zealand *Sphagnum* moss around the roots. This species is not well suited to potted culture due to its often descending, layered habit. If a plant must be potted, use a shallow bulb pan or basket with a fine bark mix or moss. *Temperature* warm to intermediate. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. May dry briefly between waterings without harm. This species does not generally undergo dormancy, though in parts of its range it may experience a brief dry period. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: The true *Epidendrum schlechterianum* is evidently not common in cultivation, although its close relatives are. This group of species has many of the same traits as *E. peperomia*. Some of the species are commonly available, all are easy to grow, making wonderful, floriferous specimen plants. The flowers are distinctive and appear to be nestled tightly in the

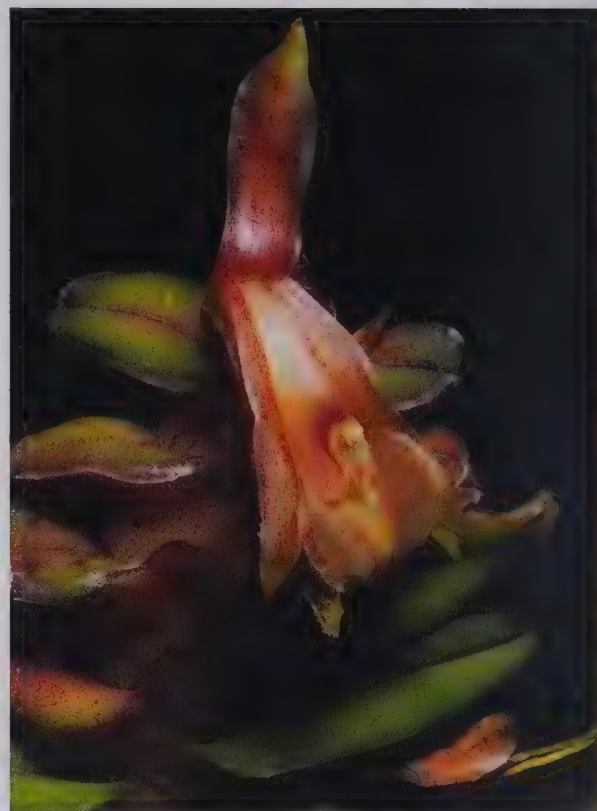


Figure 4.595 (above) Illustrated is the true *Epidendrum schlechterianum*, rare in cultivation (Photo: Rolando Jiménez).



Figure 4.596 (above) Numerous *Epidendrum congestoides* blooms (Grower: Howard Gunn).

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apices of the layered growths. The beautiful foliage consists of numerous, tightly packed and closely imbricating fleshy leaves that are often suffused with reddish or purple. In some individuals, the leafy floral bracts may change to a colour similar to that of the flowers, making the blooms seem somewhat cryptic and not immediately apparent. Species in this complex generally bloom between later winter and mid-summer in cultivation. As with *E. peperomia*, botanists have separated forms of *E. schlechterianum* based on differences that may or may not fall within its natural range of variation. These are listed below for completeness. Eric Hágsater (pers. comms., 2013) states that the true *E. schlechterianum* is endemic to central Panama, has sepals 17–20 mm long, a column that is 10–14 mm long, and that the clinandrium is deeply lacerate-dentate.

Table 4.513 A list of taxa that may fall within the range of phenotypic variation exhibited by *Epidendrum schlechterianum* across its range.

Name	Range	Reference
<i>Epidendrum serruliferum</i> Schltr.	Costa Rica, central Panama	<i>Repert. Spec. Nov. Regni Vég. Beih.</i> 19: 44 (1923)
<i>Epidendrum congestum</i> Rolfe	Costa Rica, Honduras	<i>Bull. Misc. Inform. Kew</i> 1913: 29 (1913)
<i>Epidendrum congestoides</i> Ames and C.Schweinf.	Guatemala, Honduras, Nicaragua, Costa Rica	<i>Schedul. Orchid.</i> 10: 61 (1930)
<i>Epidendrum gonzales-tamoyoi</i> Hágsater	Mexico (Jalisco to Oaxaca)	<i>Icon. Orchid.</i> 2: t. 136 (1993)
<i>Epidendrum oxynanodes</i> Hágsater	Colombia	<i>Icon. Orchid.</i> 3: t. 363 (1999)
<i>Epidendrum uleinanodes</i> Hágsater	Northern Brazil, Ecuador	<i>Icon. Orchid.</i> 3: t. 392 (1999)
<i>Epidendrum neodiscolor</i> Hágsater	Brazil	<i>Orquidea (Mexico City)</i> , n.s., 13: 217 (1994)
<i>Epidendrum longirepens</i> (C.Schweinf.) C.Schweinf.	Peru	<i>Bot. Mus. Leaf.</i> 16: 12 (1953)
<i>Epidendrum schizoclinandrium</i> D.E.Benn. & Christenson	Peru	<i>Icon. Orchid. Peruv.</i> : t. 653 (2001)



Figure 4.597 (above) A pair of *Epidendrum gonzales-tamoyoi* blooms in cultivation (Grower: Lilian Severin).

Figure 4.598 (overleaf) *Epidendrum schizoclinandrium* 'Petaluma', Certificate of Botanical Recognition, American Orchid Society (Grower: Judy Carney).





Figure 4.599 (above left) A pair of *Epidendrum schizoclinandrium* blooms. The fleshy stem is also apparent (Grower: White Oak Orchids).

Figure 4.600 (above right) A single *Epidendrum longirepens* flower (Grower: Marni Turkel).

Figure 4.601 (below) A series of pretty *Epidendrum congestoides* blooms against a foil of leaves and stems (Grower: Judy Carney).

EPIDENDRUM

Epidendrum sophronitis Lindl. & Rchb.f.

Publication: *Gard. Chron.*: 655 (1867)

Etymology: From the Greek *sophron* (modest), referring to the modest dimensions of the species.

Homotypic synonyms: *Hormidium sophronitis* (Lindl. & Rchb.f.) Benth. & Hook.f., *Kalopternix sophronitis* (Lindl. & Rchb.f.) Garay & Dunst.

Morphology: *Plant* to 7 cm, creeping, clumping, occasionally branching, pendent. *Pseudobulb* to 1.1 cm tall by up to 1.2 cm wide, sub-orbicular to oblong, completely concealed by sheaths, leaves apical, 1, rarely 2, in number, sometimes with 1 to 2 leafy bracts. *Leaf* to 10 cm long by 3 cm wide, slightly folded at base, elliptic to oblong to broadly elliptic to obovate, apex acute, bilobed, apiculate, lamina spreading, rigid, leathery, fleshy, glaucous, bluish grey to green, margins often red. *Inflorescence* a raceme, much abbreviated, subsessile, concealed by sheath, terminal. *Flower* 3–4 cm long, 1–4 flowers, successive, resupinate, widely spreading, segments sometimes slightly recurved, glaucous on exterior. Plants vary from dark green to nearly grey, but always covered with a powdery bloom.

Range, elevation and habitat: *Epidendrum sophronitis* occurs in southern Ecuador (Provinces of Azuay, Cañar, Cotopaxi, Loja, and Zamora-Chinchipe) and Peru (departments of Amazonas, Junin and Pasco), at elevations of 1500–3500 m. It grows as an epiphyte in cool to cold, scrubby, seasonally dry montane cloud forest, and in very wet montane forest low on tree trunks in deep shade. Records show various bloom-times including June to August (Peru) and generally spring to summer elsewhere, but also most other times of year. Conservation status unknown.

Culture recommendations: *Substrate* mounted on cork bark, rough-barked hardwood, small rough wood shingles and possibly tree fern. This species is not well suited to potted culture due to the pendent nature of the plant. *Temperature* cool to cold. *Light* bright shade to medium shade. *Watering* keep moist, well drained, not wet. May dry briefly between waterings without harm. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: *Epidendrum sophronitis* is a fantastic species. Not common in cultivation, nor easily grown, it is not a plant for casual growers as it is demanding of cool to quite cold temperatures, brisk air movement, and good quality water. Everything about this plant is exotic and unusual; the fairly large, starry flowers are so thick and waxy that they look almost artificial, and the side-lobes of the lip have irregular, undulate margins, while the base of the extremely pointed mid-lobe bears a peculiar, mealy callus. The forms with extremely glaucous leaves are particularly attractive and highly desirable. *Epidendrum sophronitis* seems to bloom in any month in cultivation. Taxonomically, this species is highly problematic. The original



Figure 4.602 (above) An *Epidendrum sophronitis* bloom (Grower: Howard Gunn).



Figure 4.603 (above) *Epidendrum sophronitis* with obviously glaucous foliage (Grower: Troweena Orchids).

Figure 4.604 (facing page) *Epidendrum sophronitis* (Grower: White Oak Orchids).



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description is rather vague, and additional literature is scant at best. There are plants in both collections and the trade that are labelled *E. sophronitis*, but which are actually similar, distinct species. For example, *E. farinosum* R. Vazquez & Dodson, a species from Bolivia, which has a much broader, fuller and beautifully patterned lip. A second species, *E. mantinianum* Rolfe, has a distinctly larger, boldly patterned flower with a shorter, broader and often concave lip with entire margins. There are several other closely allied species that have at times been confused with *E. sophronitis*, including *E. andreetae* Hágsater & Dodson, *E. deltoglossum* Garay & Dunst., *E. garayi* Lojtant, *E. oxapampense* Hágsater and *E. serpens* Lindl., amongst others.



Figure 4.605 (above) *Epidendrum farinosum* (Grower: Marni Turkel).

Figure 4.606 (below) *Epidendrum* aff. *E. sophronitis*, Ecuador (Grower: Marni Turkel).

Figure 4.607 (above) *Epidendrum mantinianum* (Grower: Gerardus Staal).

Figure 4.608 (below) *Epidendrum* sp. (as *oxypampense*) (Grower: Marni Turkel).

Erycina Lindl.

Publication: Lindley, J., 1853, *Fol. Orchid.* 2

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Oncidiinae

Type species: *Erycina echinata* (Kunth) Lindl., 1853, *Fol. Orchid.* 2.

Etymology: From the Latin *Venus Erycina*, referring to the Greek goddess Aphrodite, who had a centre of worship in Eryx, an ancient town and eponymous mountain in northwestern Sicily. The town corresponds with modern day Erice, near Trapani.

Heterotypic synonyms: *Psygmorchis* Dodson & Dressler, *Stacyella* Szlach.

Profile: A genus of 7 species occurring in Mexico, Central America and much of South America, as well as in Trinidad and Tobago. This genus now incorporates species formerly included in the genus *Psygmorchis*, a morphologically distinct group of fan-shaped plants lacking pseudobulbs. The current classification makes it impossible to describe a set of principle features for this genus, a situation that the authors are wholly dissatisfied with as it fails to address the unifying objectives of taxonomy.

These are three morphologically disparate groups:

1. *Pseudobulb* ovoid, prominent leafy bracts, leaves apical, 1–2 in number, annually deciduous. *Leaf* semi-leathery. *Inflorescence* raceme or few-branched panicle. *Flower* small, several to many. Two species, *Erycina echinata* and *E. hyalinobulbon*, both Mexican endemics.
2. *Pseudobulb* laterally compressed, leaves semi-persistent. *Leaf* thinly leathery. *Flower* proportionately large. One species, *Erycina crista-galli*, from Mexico to Panama, possibly Colombia. Once classified as the monotypic genus, *Stacyella* Szlach.
3. *Pseudobulb* lacking, leaves several, arranged in a fan. *Leaf* bilaterally flattened. *Inflorescence* a raceme, axillary. *Flower* proportionately large, few in number. Four species, widespread in the tropical Americas, *Erycina glossomystax*, *E. pumilio*, *E. pusilla* and *E. zamorensis*. Until recently, these species comprised the genus *Psygmorchis* Dodson & Dressler.

General plant morphology: As discussed above, common features that identify these species as falling within a distinct genus are few, other than that they have yellow flowers. The precise genus description as currently circumscribed in *Genera Orchidacearum* (Pridgeon *et al.*, 2009) is as follows:

Small, 2–10 cm, epiphytic, caespitose, psygmoid monopodial or sympodial *herbs*. *Pseudobulb* (if present) ovoid, either none or a single, apical leaf and 3–5 subtending, bifacial leaves. *Leaves* 2–9, unifacial or bifacial, articulate or not, perennial or deciduous, apiculate. *Inflorescences* 1–5, lateral, glabrous, unbranched or branched, usually longer than leaves, sometimes successively flowering, 1–25 flowered, bracts shorter than pedicels. *Flower* orientation irregular, mostly resupinate, lacking spurs, uniformly bright yellow. *Sepals* & *petals* free, or lateral sepals fused basally, otherwise similar in size and shape or petals much wider. *Labellum* trilobed to panduriform; callus a simple raised pad in middle of basal lobes or more complex and tuberculate, tufted-pilose. *Column* straight to sigmoid, often with a pair of wings or arms on sides of stigmatic cavity, anther terminal, pollinarium with stipe longer than pollinia, sometimes bent, sometimes tubular, caudicles small, viscidium oval to almost wedge-shaped, entire, ventral, pollinia 2, yellow pyriform, sometimes attached to sides of the tubularised stipe, stigmatic cavity ventral, located just below rostellum, oval. *Ovary* glabrous to echinate. *Capsule* triangular to round. *Seeds* modified *Maxillaria*-type with hooked extensions to ends of many testa cells.”

Figure 4.609 (overleaf) A mounted *Erycina hyalinobulbon* plant in bloom (Photo: Dennis Szeszko).



ERYCINA

Erycina echinata (Kunth) Lindl.

Publication: *Fol. Orchid.* 2: (1853)

Etymology: From the Latin *echinatus* (spiny), referring to the prickly surface of the ovary.

Homotypic synonym: *Oncidium echinatum* Kunth.

Heterotypic synonyms: *Oncidium echinatum* var. *backhousianum* Rchb.f., *Erycina major* Schltr.

Morphology: *Plant* to 12.5 cm tall, in nature rarely more than 8 cm, clumping to slightly repent, rhizome erect to ascending, with many upright, stiff aerial roots. *Pseudobulb* to 3 cm tall by up to 2 cm wide, ovoid, slightly compressed, with 3–5 leafy bracts, quickly deciduous, leaf apical, unifoliate, quickly deciduous. *Leaf* vestigial, minute, leafy bracts to 8 cm, rarely longer, long by up to 1.5 cm wide, oblong, apex acute, apiculate, lamina suberect, slightly leathery, fleshy, with prominent longitudinal red stripes. *Inflorescence* racemic to paniculate, lying in one plane, to 25 (occasionally to 60) cm long, 2–3 simultaneous inflorescences, branches to 10 cm long, peduncle commonly flattened, fractiflex, lateral. *Flower* to 1.5 cm long by 2.3 cm wide, many in number, successive, with many flowers open at once, resupinate, widely spreading, diurnal grass-like odour, exudes nectar at base of dorsal sepal, ovaries sharp spined.

Range, elevation and habitat: Endemic to the Pacific coastal states of Mexico (Colima, Guerrero, Jalisco, Michoacán, Nayarit, Oaxaca and Sinaloa) at elevations of 30–900 m. This species occurs in the coastal flats and foothills, growing on trees, often on the Mexican Calabash, *Crescentia alata*, and shrubs including *Opuntia* in tropical, seasonally dry, thorny, deciduous and semi-deciduous forest and oak forest often near seasonally dry creek beds. Common and abundant twig epiphytes, the plants are often found fully exposed to the sun and hang from the branches by their roots. The regions where this species grows regularly undergo up



Figure 4.610 (above) The flowers of *Erycina echinata*, a Mexican endemic (Grower: Howard Gunn).



Figure 4.611 (above) *Erycina echinata* flowers are reminiscent of *Oncidium cheiroporum* (Grower and Photo: Howard Gunn).

ERYCINA

to 8 months of dryness, receiving some condensation at night, and 4 months of often heavy rain. Plants in nature generally bloom between February and April, but also sometimes as early as December or as late as May.

Culture recommendations: *Substrate* mounted on cork bark, rough-bark hardwood, small rough wood shingles and possibly tree fern, using very little, if any, New Zealand *Sphagnum* moss around the roots. Plants are not well suited to potted culture as they should not stay constantly moist. *Temperature* warm to intermediate. *Light* bright diffuse to medium shade. *Watering* frequently from mid-spring to mid-autumn, but keep well drained, not wet. In mid to late autumn, when the pseudobulbs mature and leaves begin to yellow, reduce watering frequency. During the dry winter dormancy, when leaves have fallen, mist roots every 14 days or so, preferably on sunny days. *Humidity* high during the growing season and average to somewhat low during the rest period. *Air movement* good to brisk. *Propagation* by division or seed. Fertilisation must be withheld during the rest period to discourage premature new growth. Fertilise at 1/4 to 1/2 strength weekly, but omit during dormancy to discourage premature new growth.

Comments: *Erycina echinata* is occasionally seen in cultivation, but not as often as it should be. The exportation of plants from Mexico is now rare, and this species is not the easiest to grow, being prone to rot if kept wet or too cold during the required dry dormancy. One of the most unusual features of *E. echinata* is its plentiful, upright, sharply pointed roots that help to collect detritus in nature. The pseudobulbs have a very small, vestigial leaf that quickly drops off, but the leafy bracts are themselves attractively striped with red. If one acquires this species, propagation by seed is urged to help perpetuate horticultural stocks. In cultivation, *E. echinata* seems to bloom most frequently between late autumn and mid-late winter, corresponding with its leafless dormancy.



Figure 4.612 (above) A botanical illustration of *Erycina echinata*, Curtis' Botanical Magazine, 3: 50 (1894).

ERYCINA

Erycina glossomystax (Rchb.f.) N.H. Williams & M.W. Chase

Publication: *Lindleyana* 16: 136 (2001)

Etymology: From the Greek *glossus* (tongue) and *mystax* (moustache), referring to the form of the callus on the lip.

Homotypic synonyms: *Oncidium glossomystax* Rchb.f., *Psygmorchis glossomystax* (Rchb.f.) Dodson & Dressler.

Heterotypic synonym: *Oncidium articulatum* E.S. Rand.

Morphology: *Plant* 3–5 cm tall, erect to pendent, usually single, but can form colonies. *Pseudobulb* lacking, leaves fan shaped, to 10 in number. *Leaf* to 5 cm long by 0.7 cm wide, oblong-lanceolate to ensiform to falcate, apex acute, lamina bilaterally compressed, dorsal surface shallowly sulcate, erect, thin-textured. *Inflorescence* a raceme, to 7 cm long, usually longer than leaves, to 5 simultaneous inflorescences, erect to suberect, lateral from leaf axils. *Flower* 1.2–1.8 cm long, 1–3 in number, simultaneous to successive, resupinate, widely spreading. Flower varies in terms of its fullness, pattern, shape of callus and intensity of colour.

Range, elevation and habitat: A very widespread and common twig epiphyte, *Erycina glossomystax* is found in a variety of habitats, including montane rain forest, wet cloud forest, tropical wet forest and on cultivated guava and coffee trees. It occurs in Mexico, Guatemala, Honduras, Nicaragua, Costa Rica (province of San José, 3150 m), Panama, Colombia (departments of Antioquia and Vaupes, 800–925 m), Ecuador (provinces of Cañar, Morona-Santiago, Napo, Pastaza, Sucumbíos, Tungurahua and Zamora-Chinchipec, 250–1000 m), Peru (departments of Amazonas, Cusco, Huánuco, Jumin, Loreto, Madre de Dios and San Martín, 200–1200 m), Bolivia (departments of Cochabamba and Santa Cruz, 200–1100 m), Venezuela (states of Anzoátegui, Bolívar, Carabobo, Federal District, Mérida, Miranda and Yaracuy, 340–1450 m), French Guiana, Guyana, Suriname and Brazil (states of Paraná, Amazonas, Acre, Rondônia, Maranhão, Bahia, Espírito Santo and Rio de Janeiro). In recent years, this species has apparently not been collected north of Costa Rica. Plants in Peru usually bloom between January and March, as well as in July, but overall plants may bloom during most months of the year.



Figure 4.613 (above) *Erycina glossomystax* photographed *in situ* in Costa Rica (Photo: Diego Bogorin).

ERYCINA

Culture recommendations: *Substrate* mounted on cork bark, rough-barked hardwood, small rough wood shingles and possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. Plants may be grown potted using small pots and a well-drained mix. *Temperature* warm to intermediate. *Light* medium shade. *Watering* keep moist, well drained, not wet. May experience brief dry periods without harm. *Humidity* high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 strength. *Fertilise* at 1/4 to 1/2 strength weekly.

Comments: While not as common in collections as *Erycina pusilla*, *E. glossomystax* is quite similar to the aforementioned species. The plants and flowers of *E. glossomystax* are smaller, but it is the characteristic, complex, moustache-like callus towards the base of the lip that best distinguishes this species and which is the basis of the specific epithet. Both species are twig epiphytes in nature, and therefore often short-lived, although there are individual plants that have survived for several years in cultivation. The flattened fan, comprised of several leaves, is attractive, but the plants are stunning when in full bloom; multiple simultaneous inflorescences bear flat, brilliant yellow blooms. *Erycina glossomystax* can bloom in any season in cultivation, but does so most frequently between spring and autumn.



Figure 4.614 (above) The brightly coloured flower of *Erycina glossomystax* (Grower: Andy's Orchids).

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Erycina hyalinobulbon (Lex.) N.H. Williams & M.W. Chase

Publication: *Lindleyana* 16: 136 (2001)

Etymology: From the Greek *hyalinus* (nearly transparent) and *bulbon* (bulb), referring to the often pale appearance of the pseudobulb.

Homotypic synonyms: *Oncidium hyalinobulbon* Lex. ; *Leochilus hyalinobulbon* (Lex.) Schltr.

Heterotypic synonyms: *Oncidium diaphanum* Rchb.f., *Erycina diaphana* (Rchb.f.) Schltr., *Leochilus diaphanus* (Rchb.f.) Schltr.

Morphology: *Plant* to 10 cm tall, pseudobulbs clustered, usually with masses of hair-like aerial roots. *Pseudobulb* to 2.5 cm tall by 2 cm wide, ovoid, slightly compressed laterally, enclosed in leaf-like bracts to 7 cm long, leaf apical, leaves and bracts deciduous. *Leaf* to 8 cm long by up to 0.6 cm wide, lanceolate to ligulate, apex acute, lamina suberect to spreading, arcuate. *Inflorescence* a raceme, to 15 cm long, suberect to descending, slender, with subtending bracts, lateral, usually blooming on leafless pseudobulb. *Flower* 0.7–1 cm wide, 6–14 in number, mostly simultaneous resupinate, widely spreading.

Range, elevation and habitat: Endemic to western Mexico, *Erycina hyalinobulbon* is found on the Pacific slopes of the states of Guerrero, Jalisco, México, Michoacán, Morelos, Nayarit and Oaxaca. A common to locally abundant species, it grows as an epiphyte, often on the underside of branches, on trees along streams in dry or humid deciduous forest, as well as in oak and mixed oak/pine forest at elevations of 1200–2400 m. It blooms between December and March.

Culture recommendations: *Substrate* best mounted on cork bark, rough-barked hardwood, small rough wood shingles and possibly tree fern, using very little moss if any around the roots. As a twig epiphyte, this species is not well suited to potted culture as plants do not tolerate constantly wet conditions. If grown potted, use a pot that is as small as possible with a mix that ensures the plants dry out quickly after watering. *Temperature* intermediate to intermediate-cool. *Light* bright shade whilst in growth, but bright diffuse during dormant season. *Watering* from mid-spring to mid-autumn water frequently, but keep well drained, not wet. In mid to late autumn, when the pseudobulbs mature and leaves begin to yellow, reduce watering frequency. During the dry winter dormancy, when leaves have fallen, mist the roots every 14 days or so, preferably on sunny days. *Humidity* high during growing season and average to somewhat low during the rest period. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, but omit during dormancy to discourage premature new growth.

Comments: *Erycina hyalinobulbon* is a very charming species, and it is amazing to watch the transformation from a little, leafless pseudobulb

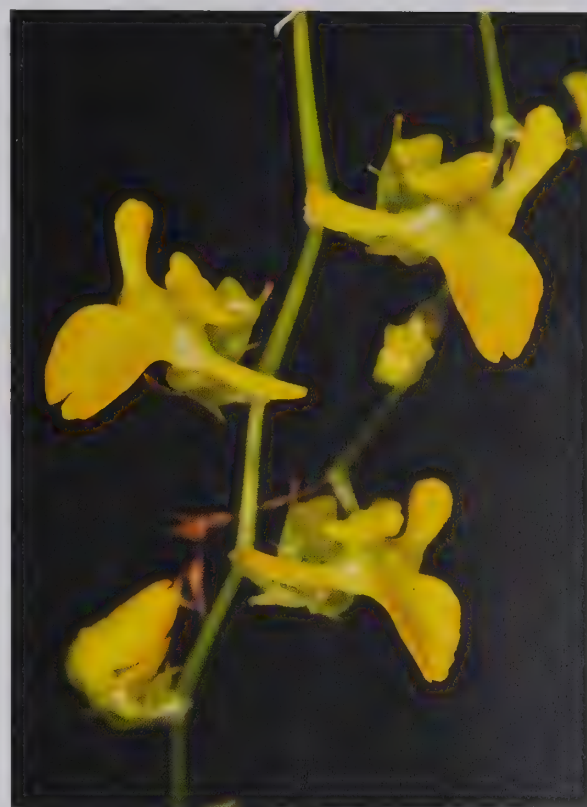


Figure 4.615 (above) Flowers of *Erycina hyalinobulbon* (Grower: Mary Gerritsen).



Figure 4.616 (above) An *Erycina hyalinobulbon* inflorescence (Photo: Dennis Szeszko).

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covered in papery bracts to one that sprouts a lovely inflorescence bearing brilliant yellow flowers. After blooming, new foliage soon emerges and the plant becomes green and leafy. Once considered an *Oncidium*, the flowers of this species are reminiscent of *O. cheirophorum* Rchb.f. This species is uncommon in collections and, if obtained, it is important to ensure that its culture requirements are followed closely. Propagation of cultivated plants is also encouraged. Plants bloom in cultivation during the winter dormancy, as in nature. Many plants are still labelled as *Oncidium diaphanum* and *Erycina diaphana* in collections.



Figure 4.617 (above) A gaudy spray of *Erycina hyalinobulbon* flowers (Grower: Marni Turkel).

ERYCINA*Erycina pusilla* (L.) N.H. Williams & M.W. Chase**Publication:** *Lindleyana* 16: 136 (2001)**Etymology:** From the Latin *pusillus* (very small, insignificant) possibly referring to the dimensions of the plant.**Homotypic synonyms:** *Epidendrum pusillum* L., *Cymbidium pusillum* (L.) Sw., *Oncidium pusillum* (L.) Rchb.f., *Tolumnia pusilla* (L.) Hoehne, *Psygmorechis pusilla* (L.) Dodson & Dressler.**Heterotypic synonyms:** *Oncidium iridifolium* Kunth, *Epidendrum ventilabrum* Vell., *Oncidium allemanii* Barb.Rodr., *Oncidium pusillum* var. *megalanthum* Schltr., *Psygmorechis allemanii* (Barb.Rodr.) Garay & Stacy, *Erycina allemanii* (Barb.Rodr.) N.H. Williams & M.W. Chase.**Morphology:** Plant 2.5–8 cm wide, short rhizome, erect to spreading, fan shaped, usually single, can form colonies. *Pseudobulb* absent, leaves equitant, distichous, several in number. *Leaf* to 4 cm long by 0.6 cm wide, falcate to lanceolate, apex acute to obtuse, lamina bilaterally compressed, erect, thinly leathery. *Inflorescence* a raceme, to 8 cm, single to 6 simultaneous inflorescences, erect to suberect, slender, lateral from leaf axils. *Flower* 2–2.5 cm long, to several in number, successive, 1–2 open simultaneously, resupinate, widely spreading. Flowers vary in number of spots, shape of lip and lip callus, intensity of colour, and in the pattern of brown barring on the petals and around the callus.**Range, elevation and habitat:** *Erycina pusilla* is an unusually widespread species, occurring in Mexico (states of Campeche, Chiapas and Yucatan, 80–370 m), Guatemala (departments of Alta Verapaz, Izabal and Petén, 350–600 m), Belize (districts of Stann Creek and Toledo, 80–140 m), Honduras (departments of Atlántida and Copán, 20–370 m), Nicaragua (departments of Atlántico Norte, Atlántico Sur, Estelí, Granada, Jinotega, Matagalpa, Río San Juan and Zelaya, 0–1100 m), Costa Rica (provinces of Heredia, Limón, Puntarenas and San José, 20–740 m), Panama (provinces of Bocas del Toro, Canal Area, Coclé, Colón, Darién, Panamá and San Blas, 0–1000 m), Colombia (departments of Chocó and Valle del Cauca, 40–1300 m), Ecuador (provinces of Bolívar, Chimborazo, Cotopaxi, El Oro, Esmeraldas, Guayas, Loja, Los Rios, Manabí, Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Sucumbios and Zamora-Chinchipe, 70–1800 m), Peru (departments of Amazonas, Cusco, Huánuco, Junín, Loreto, Madre de Dios and San Martín, 90–1000 m), Bolivia (departments of Beni, Cochabamba, La Paz, Pando and Santa Cruz, 130–1000 m), Venezuela (states of Amazonas, Bolívar, Delta Amacuro and Portuguesa, 50–300 m), French Guiana, Guyana (0–800 m), Suriname (50 m), Brazil (states of Roraima, Amapá, Pará, Amazonas, Acre, Rondônia, Maranhão, Ceará, Bahia, Mato Grosso, Goiás, Minas Gerais and Rio de Janeiro) and Trinidad and Tobago. This species is common to extremely abundant, and is usually found at elevations of less than 800 m in hot, humid, wet**Figure 4.618 (above)** A pair of *Erycina pusilla* flowers (Grower: Andy's Orchids).**Figure 4.619 (above)** The *Erycina pusilla* bloom (Grower: Chaunie Langland).

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forest growing as a twig epiphyte, or even on leaves, on trees and shrubs. However, this species may also be found in tropical dry, moist or wet forest, on vestigial shrubs in pastures, as well as on cultivated coffee, cacao and citrus trees. Plants tend to be short-lived in nature, but may live for 5–8 years. Flowering may occur in any month.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles and possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. Plants may be grown potted using small pots and a well-drained mix. *Temperature* warm to intermediate. *Light* medium shade. *Watering* moist, allow to dry briefly between waterings. *Humidity* average to high. *Air movement* good. *Propagation* seed, rarely by division. *Fertilise* at 1/4 strength, reduce frequency during winter months.

Comments: Similar to *Erycina glossomystax* (q.v.), but more readily available, *E. pusilla* has beautiful, proportionately large, flat flowers that are held away from the plant. Thriving plants can produce several simultaneous spikes, each with one or two bright yellow flowers that seem to dance at the end of the spike. This species is also a twig epiphyte and tends to be somewhat short-lived both in nature and in cultivation, although some plants may live for several years. While their short life span may be viewed as a drawback, plants start to bloom when quite young, much earlier than for most orchids. *Erycina pusilla* is often seen in cultivation labelled as either *Oncidium pusillum* or *Psygmorchis pusilla*. Plants can bloom in any season in cultivation, but do so most often between spring and autumn.



Figure 4.620 (above) *Erycina pusilla* flowers are variably speckled with reddish pigment (Grower: Andy's Orchids).



Figure 4.621 (above) *Erycina pusilla* growing as a twig epiphyte on a tree in Mexico (Photo: Dennis Szeszko).

Fernandezia Ruiz & Pav.

Publication: Ruiz López, H. & Pavon, J. A., 1794, *Fl. Peruv. Prodr.*: 123

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Oncidiinae

Type species: *Fernandezia subbiflora* Ruiz & Pav., 1798, *Syst. Veg. Fl. Peruv. Chil.*: 240.

Etymology: Named for the Spanish physician and botanist, Gregoria Garcia Fernández, a contemporary of Ruiz and Pavón.

Heterotypic synonyms: *Centropetalum* Lindl., *Nasonia* Lindl., *Orchidotypus* Kraenzl., *Pachyphyllum* Kunth, *Raycadenco* Dodson.

Profile: A genus of nearly 50 epiphytic species occurring in southern Mexico south through Central America to Venezuela and Peru. They are found in cool to cold cloud forest at high elevations, usually greater than 2000 m.

General plant morphology: Small, clumping, monopodial, erect to suberect. *Pseudobulb* absent, leaves distichous, numerous. *Leaf* rigid, leathery. *Inflorescence* a raceme, short, axillary. *Flower* mostly resupinate, usually brightly coloured (red, orange, or yellow), sepals and petals free, similar, proportionately large, lip triangular to lanceolate, callus a bilobed pad in middle of basal portion, column straight, with a large terminal hood or pair of expanded arms, pollinia 2.



Figure 4.622 (above) A *Fernandezia subbiflora* plant putting on a show of flamboyant flowers (Photo: Steve Beckendorf).

FERNANDEZIA

Fernandezia ionanthera (Rchb.f. & Warsz.) Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 16: 249 (1920)

Etymology: From the Greek *ion-* (violet) and *anthos* (flower), referring to the purple colouration on the dorsal surface of the column.

Homotypic synonyms: *Nasonia ionanthera* Rchb.f. & Warsz., *Centropetalum ionantherum* (Rchb.f. & Warsz.) Kraenzl.

Morphology: Plant 11–15 cm long, single, occasionally branching from base, erect to pendent, leaves numerous. Leaf to 2 cm long by 0.4 cm wide, ovate to lanceolate, apex acute, lamina conduplicate, thick, leathery, rigid. Inflorescence a raceme, very short, to four simultaneous inflorescences, axillary, distal. Flower 1.5–2 cm long, single, resupinate, widely spreading, column proportionately large. Flowers vary in colour from orangey red to red, and in the size of the purple spot of the column.

Range, elevation and habitat: *Fernandezia ionanthera* occurs in southern Ecuador (provinces of Loja and Zamora-Chinchipec) and central Peru (departments of Cajamarca, Amazonas and Huánuco) at elevations of 2100–3100 m in high elevation, cold, wet, cloud forest. It grows as a locally common epiphyte, often forming colonies on twigs, branches and tree trunks. Plants may bloom in most months.

Culture recommendations: Substrate mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern using a small amount of New Zealand *Sphagnum* moss around the roots. This species is not well suited to potted culture. Temperature cool to cold. Light bright diffuse, but ensure temperatures are cool and humidity is high. Watering water frequently, allowing roots to dry briefly between waterings. Humidity high. Air movement brisk. Propagation seed, rarely by division. Fertilise at 1/4 strength weekly. Fertilise at 1/4 strength weekly.

Comments: As with *Telipogon*, keeping members of the genus *Fernandezia* alive can challenge even the most experienced growers of cool to cold-growing orchids. However, these plants are both so splendid and so desirable that many collectors will try their luck again and again. The two species addressed in this work are also two of the most beautiful. *Fernandezia ionanthera* has a stunning and much coveted deep red flower with a prominent, large, dark purplish blotch on the column. Though some individuals have had success with both this species and *F. subbiflora*, no attempts should be made to grow this plant if one is unable to provide consistently cool to cold - never hot - greenhouse conditions with brisk air movement, bright diffuse light and excellent quality water. This rare species can bloom at anytime in cultivation, provided that the conditions are perfect.



Figure 4.623 (above) The challenging *Fernandezia ionanthera* produces marvellous red blooms (Grower: Ernie Katler).



Figure 4.624 (above) *Fernandezia ionanthera* requires consistently cool to cold growing conditions, and any deviations can result in the loss of plants (Grower: Ron Parsons).



Figure 4.625 (above left) *Fernandezia ionanthera* emerging from amongst lichens on a branch (Photo: Steve Backendorf).

Figure 4.626 (above right) *Fernandezia ionanthera* plants decorate the trunk of a tree in South America (Photo: Steve Backendorf).

Figure 4.627 (below) As an epiphyte, even the diminutive *Fernandezia ionanthera* towers above the undergrowth (Photo: Steve Backendorf).

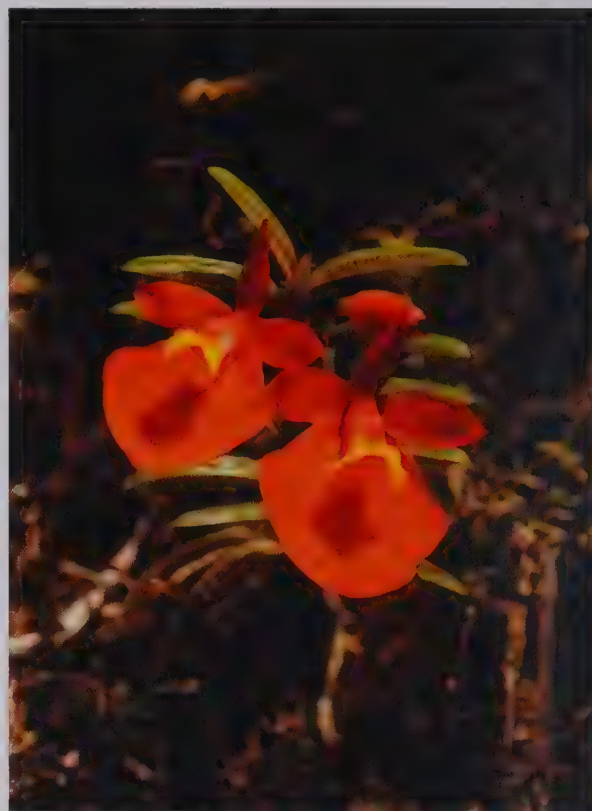
FERNANDEZIA***Fernandezia subbiflora* Ruiz & Pav.****Publication:** *Syst. Veg. Fl. Peruv. Chil.*: 240 (1798)**Etymology:** From the Latin *sub-* (less than, below), *bi-* (two) and *florem* (flower), meaning less than two flowers, referring to the single-flowered inflorescence.**Homotypic synonym:** *Pachyphyllum subbiflorum* (Ruiz & Pav.) Schltr.**Heterotypic synonyms:** *Centropetalum distichum* Lindl., *Centropetalum warszewiczii* Rchb.f., *Fernandezia disticha* (Lindl.) Schltr., *Fernandezia warszewiczii* (Rchb.f.) Schltr., *Fernandezia pulchra* Schltr.**Morphology:** Plant 5–12 cm tall, 1.5–3 cm wide, single growths, occasionally branching from base, erect to suberect. Leaf to 1.5 cm long by 0.2 cm wide, linear to narrowly ovate, apex acute, lamina conduplicate, slightly falcate, recurved, thick, fleshy, rugose. Inflorescence a raceme, short, often several simultaneous inflorescences, axillary, distal. Flower 1.7–2 cm long, single, resupinate, spreading widely, column proportionately large. Flowers vary in colour from orange to red-orange.**Range, elevation and habitat:** *Fernandezia subbiflora* occurs in Ecuador (provinces of Loja and Zamora-Chinchipe) and Peru (departments of Amazonas, Cajamarca, Huánuco, Piura and Pasco) at elevations of 2400–3550 m. It grows in cold and wet conditions in high elevation cloud forest as a locally common epiphyte on trees, or as a lithophyte on shady, vertical rock faces. In Ecuador it blooms between January and April, and between July and October. In Peru, it blooms in most months of the year.**Culture recommendations:** Substrate mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. This species is not suited to pot culture. Temperature cool to cold. Light bright diffuse, but ensure temperatures are cool and humidity is high. Watering water frequently, allow roots to dry briefly between waterings. Humidity high. Air movement brisk. Propagation seed, rarely by division. Fertilise at 1/4 strength weekly, reducing frequency and strength during winter.**Comments:** *Fernandezia subbiflora* is another species that is rarely seen in collections. It is no less desirable and no less challenging than its close relative, *F. ionanthera*. The flowers of *F. subbiflora* are red-orange to distinctly orange, offset nicely by the bright yellow apex of the column. As with *F. ionanthera*, and indeed all other species of this genus, plants should not be purchased unless their demanding cultural requirements can be met. *Fernandezia subbiflora* may bloom at any time of year in cultivation.**Figure 4.628 (above)** *Fernandezia subbiflora* flowering in situ (Photo: Gary Yong Gee).**Figure 4.629 (above)** Flowers of *Fernandezia subbiflora* emerge from a tangle of moss (Photo: Mary Gerritsen).



Figure 4.630 (above) *Fernandezia subbiflora* blooms appear as splashes of colour amidst the trees and verdant growth of moss (Photo: Steve Beckendorf).
Figure 4.631 (below) *Fernandezia subbiflora* with blooms of a lighter orange flowering in cultivation (Grower: John Leathers).

Gastrochilus D.Don

Publication: Don, D., 1825, *Prodr. Fl. Nepal.*: 32

Subfamily: Epidendroideae

Tribe: Vandeae

Subtribe: Aeridinae

Type species: *Gastrochilus calceolaris* (Sm.) D.Don, 1825, *Prodr. Fl. Nepal.*: 32 (formerly *Aerides calceolaris* (Buch.-Ham. ex) Sm. in Rees, *Cycl.* 39: *Aerides* no. 11, 1819).

Etymology: From the Greek *gaster* (belly) and *cheilos* (lip), referring to the stomach-shaped, saccate lip.

Heterotypic synonym: *Lusiopsis* Sath.Kumar & P.C.S.Kumar.

Profile: A genus of approximately 58 species, widespread in tropical and subtropical Asia, including eastern India.

General plant morphology: Monopodial, short to long stems, often branching at base, erect to pendent, rooting at base or along stem, leaves few to numerous, distichous. *Leaf* strap-shaped, lanceolate or oblong, sometimes falcate, leathery. *Inflorescence* a raceme, short, unbranched. *Flower* sepals and petals subsimilar, spreading, lip saccate, joined at base to column wings, mid-lobe often ornamented with fleshy hairs. Pollinia 2, rarely 4. Flower colour variable, but often shades of white to yellow with dark spotting and barring.

Comments: *Gastrochilus* is a somewhat underappreciated genus. While many growers have one or two of the larger species, there is a multitude of small to miniature species that are highly collectable. A number of these species are not readily obtainable, but all are worth the effort to locate and very rewarding to grow.

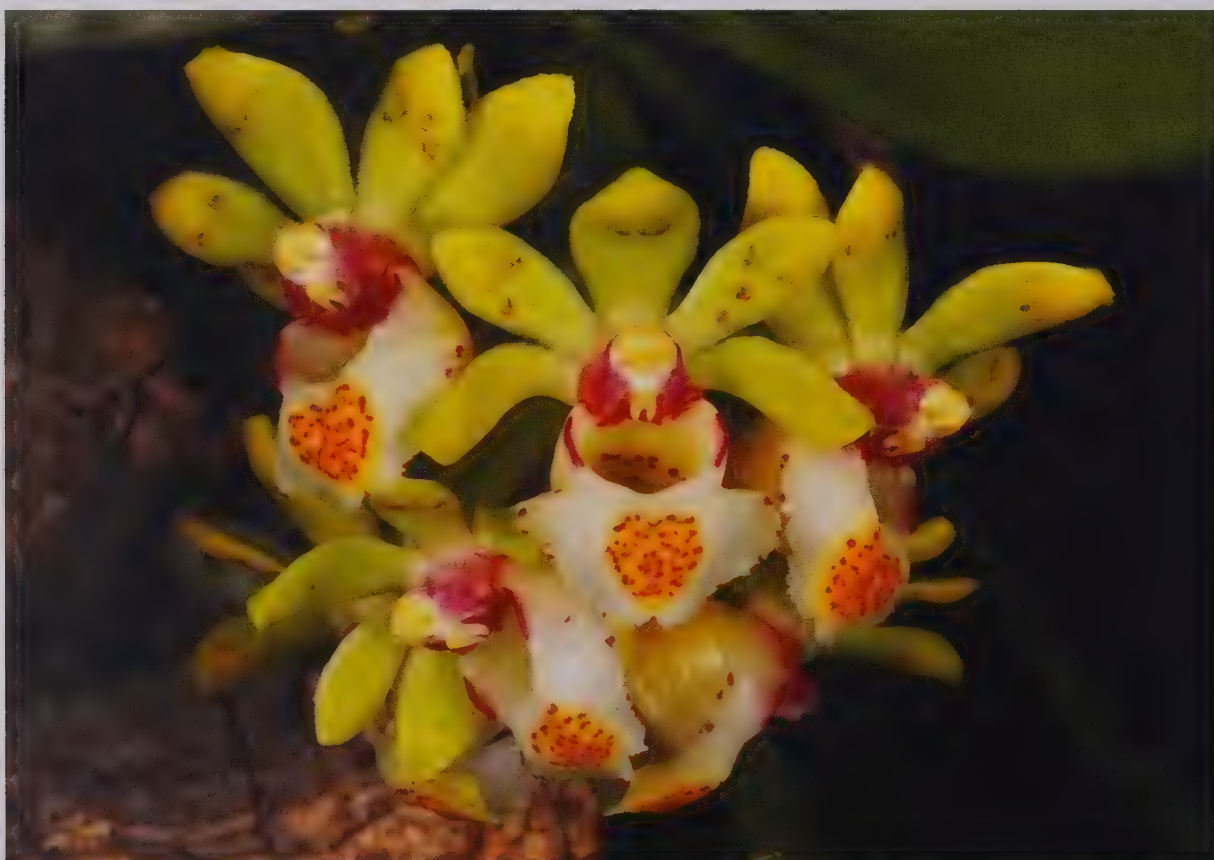


Figure 4.632 (above) The attractive flowers of *Gastrochilus japonicus* (Grower: Ron Parsons).

GASTROCHILUS

Gastrochilus formosanus (Hayata) Hayata

Publication: *Icon. Pl. Formosan.* 4: Add. & Corr. (1915)

Etymology: From the island of Formosa, now called Taiwan.

Homotypic synonym: *Saccolabium formosanum* Hayata.

Heterotypic synonyms: *Gastrochilus pumilus* Hayata, *Gastrochilus quasipinifolius* Hayata, *Gastrochilus nebulosus* Fukuy., *Gastrochilus rupestris* Fukuy., *Gastrochilus quercetorus* Fukuy., *Saccolabium nebulosum* (Fukuy.) S.Y.Hu, *Saccolabium quercetorum* (Fukuy.) S.Y.Hu, *Saccolabium rupestre* (Fukuy.) S.Y.Hu, *Gastrochilus shaoyaoii* S.S.Ying, *Saccolabium shaoyaoii* S.S.Ying, *Gastrochilus formosanus* var. *shaoyaoii* (S.S.Ying) S.S.Ying.

Morphology: Plant to 5 cm wide, to 15 cm long, creeping to pendent, leaves spaced 0.2–0.3 cm apart along rhizome, branching freely at base and along stem, mat-forming, roots relatively thick, rooting along rhizome at leaf axils. Leaf 1.8–2.5 cm long by 0.3–0.7 cm wide, subpetiolate, ovate to elliptic-oblong, apex acute, apiculate, lamina slightly falcate, leathery, slightly fleshy, rigid, lightly spotted with purplish. Inflorescence sub-umbellate raceme, short peduncle, to several simultaneous inflorescences to 2 cm long. Flower 0.7–0.9 cm in diameter, 2–9 in number, simultaneous, resupinate, spreading, somewhat randomly orientated. Flowers vary from greenish with brownish spotting to yellowish with reddish spotting.

Range, elevation and habitat: *Gastrochilus formosanus* is found in Taiwan and China (southern Shaanxi, western Hubei and northern Fujian provinces). In the Central Mountain ranges of Taiwan, it is a common epiphyte on the semi-shaded trunks and branches of large trees in montane, broadleaf and pine forests at 500–2500 m. Conflicting reports state that it usually blooms in winter or in early summer. Conservation status unknown.

Culture recommendations: *Substrate* Mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. This species is not suited to pot culture due to its creeping, elongated rhizome. *Temperature* intermediate-cool. *Light* bright shade to medium shade. *Watering* water frequently, allowing to dry briefly between waterings. Reduce watering frequency in winter. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, reducing fertiliser during winter.

Comments: *Gastrochilus formosanus* is a member of section Microphyllae. It has a wonderful, mat-forming habit that is attractive even out of bloom. The small flowers bloom in tight clusters from leaf axils along the stem, and a large plant in full bloom can be a wondrous sight. Though uncommon in cultivation, this species can be found with some effort, unlike some of its close relatives. In cultivation, flowering tends to occur in late winter to early spring, and sometimes in mid to late summer.

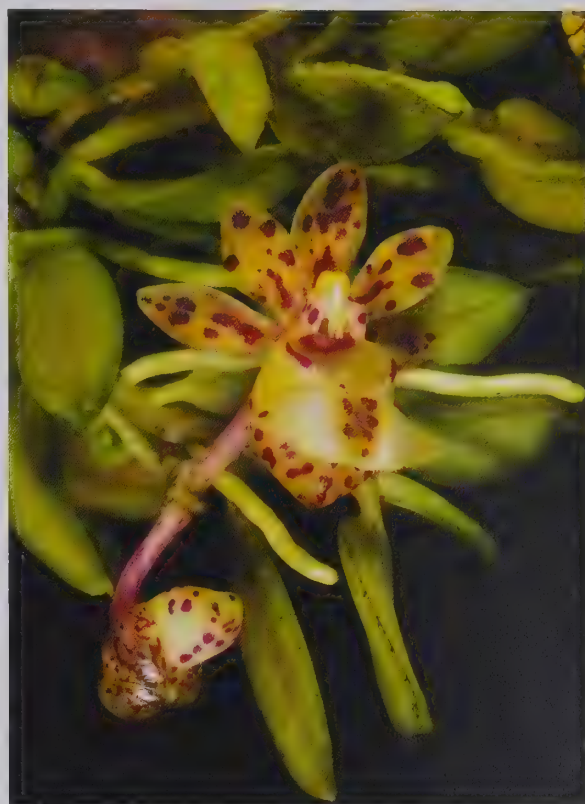


Figure 4.633 (above) *Gastrochilus formosanus*, a native of Taiwan and China (Grower: Cindy Hill).



Figure 4.634 (above) Flower detail of *Gastrochilus formosanus* (Grower: Cindy Hill).

GASTROCHILUS

Gastrochilus fuscopunctatus (Hayata) Hayata

Publication: *Icon. Pl. Formosan.* 6 (Suppl.): 78 (1917)

Etymology: From the Latin *fuscus* (dusky brown) and *punctatus* (marked with points or holes), referring to the purplish spotting on the leaves.

Homotypic synonym: *Saccolabium fuscopunctatum* Hayata.

Morphology: *Plant* to 4 cm wide, stems to 10 cm long, pendent to creeping, apex of stems tend to turn slightly upwards, freely branching usually at or near base, forms layered mats, leaves many, distichous, rooting along stem at leaf axils, roots knotty. *Leaf* 1.5–2.2 cm long by 0.3–0.7 cm wide, sessile, oblong to falcate-oblong, apex obtuse to acute, minutely bilobed/trilobed, lamina usually densely spotted with purplish red, leaves more pale and more densely spotted beneath, sometimes unspotted. *Inflorescence* sub-umbellate raceme, 1–2 cm long, to 3 simultaneous inflorescences, occasionally more, pendent, axillary. *Flower* 0.7–0.9 cm wide, to 5 in number, occasionally more, simultaneous, resupinate, spreading, lip pouched with apical spout. Flowers vary in colour, from yellowish to greenish, as well as in the density and size of spotting.

Range, elevation and habitat: *Gastrochilus fuscopunctatus* occurs in the Central Mountain range of north and central Taiwan at elevations of 1000–2500 m. It grows on moss and lichen covered tree trunks and branches in dense broadleaf forest. In nature, it is often found growing with *Ascocentrum pumilum* and *Holcoglossum quasipinifolium* on *Quercus*, usually blooming between January and July.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles and possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. This species is not suited to pot culture due to the pendent nature of the plant. *Temperature* intermediate to cool. *Light* bright shade. *Watering* water frequently, allowing roots to dry briefly between watering. *Humidity* high. *Air movement* good. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly.

Comments: The Kew Monocot List currently considers *Gastrochilus fuscopunctatus* a synonym of *G. pseudodistichus*; the authors and many authorities believe this to be incorrect. Although similar, the differences are apparent when the two species are seen together. *Gastrochilus pseudodistichus* has lanceolate, generally unspotted leaves, and the plant attaches to the substrate as it creeps via unknotted roots that emerge along the stem. Although the flowers of both species have the typical, pouch-like lip of the genus, the lip of *G. fuscopunctatus* differs in having a small, apical spout reminiscent of a teapot.

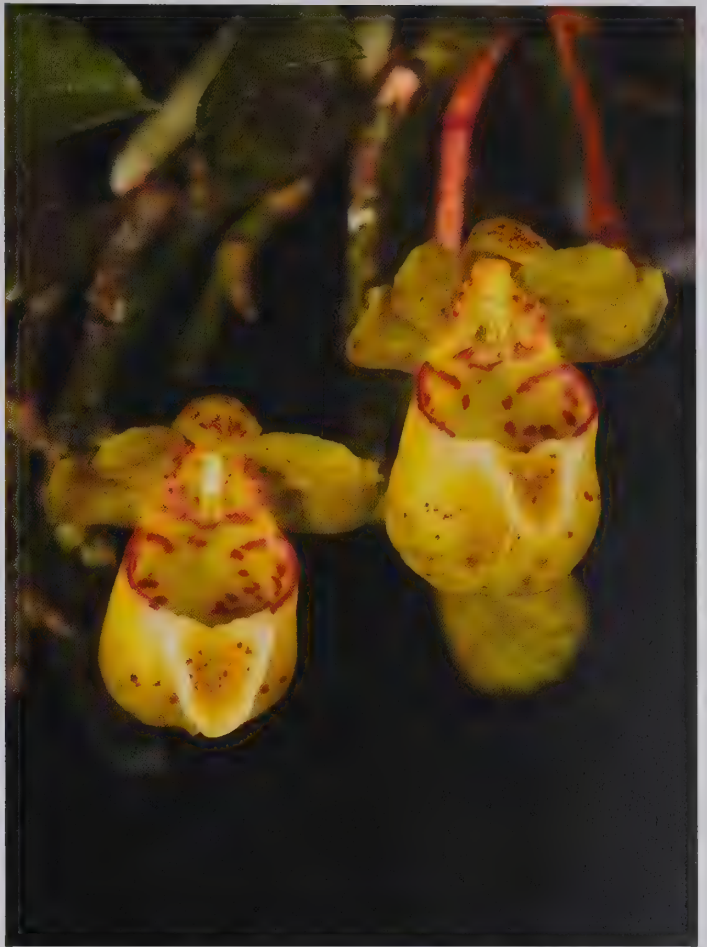
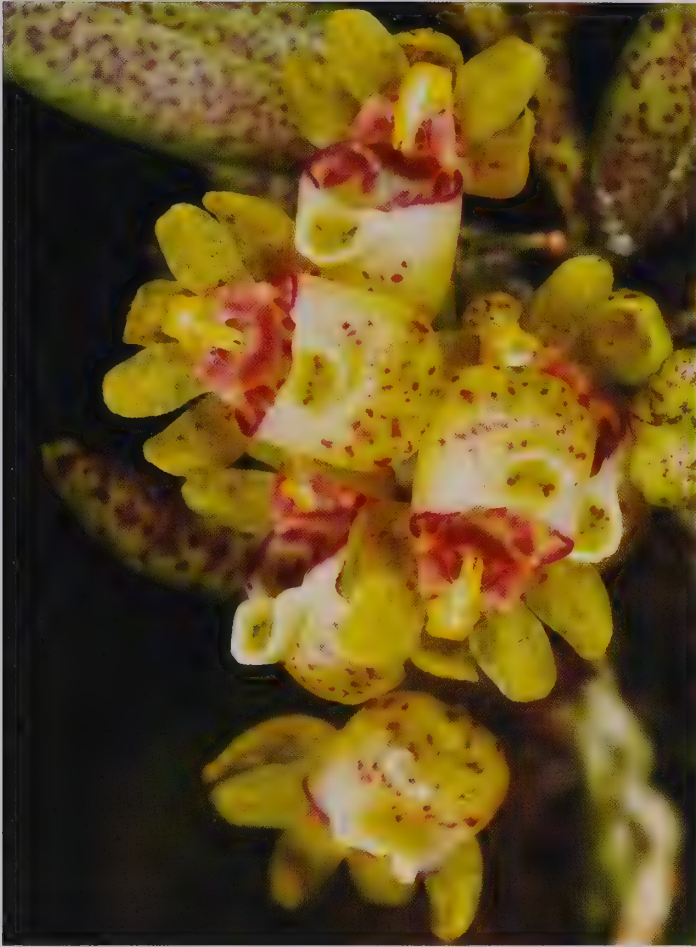
Gastrochilus fuscopunctatus is probably the easiest to obtain and most commonly grown smaller species in the genus. Often the first thing noticed about this species is the extremely attractive plant with its pendent growths that turn upward at the tip, and the usually boldly spotted leaves. The plants can branch prolifically, and gradually develop an enticing, layered appearance. Whilst somewhat cryptic, the charming, intricate little flowers hang down from a short stem beneath the leaves and are well worth examining!

Figure 4.635 (facing page, above left) *Gastrochilus fuscopunctatus* 'Lil' (Grower: Marni Turkel).

Figure 4.636 (facing page, above right) A pair of *Gastrochilus fuscopunctatus* blooms (Grower: Marni Turkel).

Figure 4.637 (facing page, below left) *Gastrochilus pseudodistichus* is a closely related, but clearly distinct taxon (Grower: Marni Turkel).

Figure 4.638 (facing page, below right) The flowers of *Gastrochilus pseudodistichus* lack the spout-like lip of *G. fuscopunctatus* (Grower: Marni Turkel).



GASTROCHILUS

Gastrochilus japonicus (Makino) Schltr.

Publication: *Repert. Spec. Nov. Regni Veg.* 12: 315 (1913)

Etymology: The Latinised toponym of Japan plus the suffix *-icus* (of, belonging to).

Homotypic synonym: *Saccolabium japonicum* Makino.

Heterotypic synonyms: *Gastrochilus holttumianus* S.Y.Hu & Barretto;
Gastrochilus taiwanianus S.S.Ying.

Morphology: *Plant* to 12 cm wide, stem to 8 cm tall, single to slowly clump-forming, branching sometimes at base, leaves generally opposite, but often tending to curve inward as the plant ages, several to many (to 14 or more in cultivation). *Leaf* to 10 cm long, rarely longer, by up to 2.7 cm wide, subpetiolate, linear-falcate to elliptic-oblong, falcate to nearly straight, apex sub-acute, unequally bilobed, lamina stiff, leathery, semi-flexible, margins undulate to flat. *Inflorescence* umbellate raceme, to 3 cm long, 1–3 (to several on larger plants) simultaneous inflorescences, pendent, axillary. *Flower* to 2 cm, to 10 in number, thick textured, spreading widely, fragrant. Flowers vary in colour from clear yellow to greenish yellow, and in the intensity of red markings and spot size and density.

Range, elevation and habitat: *Gastrochilus japonicus* occurs in Japan, the Ryukyu Islands, Taiwan and possibly Hong Kong. In Taiwan, this epiphyte grows in mixed forests at 200–1500 m; in Japan it grows in submontane and montane forests of broadleaved trees and pines at elevations of 500–2000 m. *Gastrochilus japonicus* blooms in late summer to autumn.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. This species is not well-suited to potted culture. *Temperature* intermediate-cool. *Light* bright shade to medium shade. *Watering* water frequently, allowing roots to dry briefly between waterings. In winter, reduce watering frequency. *Humidity* high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 strength weekly, reducing fertiliser during winter.

Comments: Long known incorrectly as *Gastrochilus somai* in cultivation, many plants are still labelled as such. *Gastrochilus japonicus* is truly worth growing, and plants can be particularly attractive, especially the forms with broad, falcate leaves and undulating margins. It is the flowers that captivate; yellow to light green in colour, with a white, pouched lip that is red at the base and variably spotted, they all turn inwards, gathered in a tight cluster, and emit a mild, pleasing fragrance. A plant with three or more simultaneous spikes is truly dazzling. This species is relatively obtainable. *Gastrochilus japonicus* blooms between early summer and mid-autumn in cultivation, but plants can flower at other times of the year.



Figure 4.639 (above) The clustered *Gastrochilus japonicus* inflorescence (Grower: Marni Turkel).



Figure 4.640 (above) *Gastrochilus japonicus* blooms are both attractive and mildly fragrant (Grower: Marni Turkel).

Figure 4.641 (facing page) A mounted *Gastrochilus japonicus* specimen in flower (Grower: Marni Turkel).



Gomesa R.Br.**Publication:** Brown, R., 1815, *Bot. Mag.* 42: t. 1748**Subfamily:** Epidendroideae**Tribe:** Maxillarieae**Subtribe:** Oncidiinae**Type species:** *Gomesa recurva* R.Br., 1815, *Bot. Mag.* 42: t. 1748.**Etymology:** Named in honour of Bernadino António Gomes (1769–1823), physician and botanist of the Portuguese navy. Gomes was known for his interest in plants of medicinal value, and wrote a book on the medicinal plants of Brazil.**Heterotypic synonyms:** *Alatiglossum* Baptista, *Ampliglossum* Campacci, *Anettea* Szlach. & Mytnik, *Baptistonia* Barb.Rodr., *Binotia* Rolfe, *Brasilidium* Campacci, *Campaccia* Baptista, P.A.Harding & V.P.Castro, *Carenidium* Baptista, *Carria* V.P.Castro & K.G.Lacerda, nom. illeg., *Carriella* V.P.Castro & K.G.Lacerda, *Castroa* Guiard, *Concocidium* Romowicz & Szlach., *Coppensia* Dumort., *Hardingia* Docha Neto & Baptista, *Hellerorchis* A.D.Hawkes nom. superfl., *Kleberiella* V.P.Castro & Cath., *Materna* Raf., *Menezesiella* Chiron & V.P.Castro, *Neoruschia* Cath. & V.P.Castro, *Nitidocidium* F.Barros & V.T.Rodrigues, *Ornithophora* Barb.Rodr., *Physanthera* Bertero ex Steud. nom. inval., *Rhinocerotidium* Szlach., *Rhinocidium* Baptista, *Rodrigueziella* Kuntze, *Rodrigueziopsis* Schltr., *Theodorea* Barb.Rodr. nom. illeg., *Waluewa* Regel.**Profile:** As recently redefined, a genus of about 125 species with the centre of diversity in the Mata Atlântica of Brazil, and also occurring in Venezuela, Argentina, Paraguay, Bolivia and Amazonian Peru. A recent paper by Chase *et al.* (2009) transferred many taxa in the Oncidiinae with a Brazilian distribution into *Gomesa*. This classification is rejected by certain Brazilian taxonomists, a stance shared by the authors, as it has united what were morphologically substantially disparate genera.**General plant morphology:** Sympodial, epiphytic, lithophytic or terrestrial, usually clumping, some species repent or nearly stoloniferous. *Pseudobulb* ovoid to obovoid, two edged, leaves 2–4 in number. *Leaf* conduplicate, deciduous to persistent. *Inflorescence* a raceme or panicle, one or two in number, usually longer than leaves, glabrous, lateral from base of pseudobulb. *Flower* few to many in number, resupinate, dorsal sepal free, lateral sepals usually fused to some degree, petals free, subsimilar to dorsal sepal, lip obovate to panduriform, callus usually complex, sometimes simple, concave, secreting oil, glabrous to densely hairy, column straight to arcuate, anther terminal, pollinia 2.**Figure 4.642 (above)** Flowers of *Gomesa crispa*. This species exemplifies what was once considered a typical *Gomesa* (Grower: Napa Valley Orchids).

GOMESA

Gomesa colorata (Königer & J.G.Weinm.) M.W.Chase & N.H.Williams

Publication: *Phytotaxa* 1: 58 (2009)

Etymology: From the Latin *coloratus* (coloured), with reference to the brightly coloured flowers.

Homotypic synonyms: *Oncidium coloratum* Königer & J.G.Weinm.bis, *Carria colorata* (Königer & J.G.Weinm.bis) V.P.Castro & K.G.Lacerda, *Carriella colorata* (Königer & J.G.Weinm.bis) V.P.Castro & K.G.Lacerda, *Baptistonia colorata* (Königer & J.G.Weinm.bis) Chiron.

Morphology: *Plant* 5–7 cm tall, clumping, branching, slowly creeping. *Pseudobulb* to 1.5 cm tall by 0.7 cm wide, ovoid to narrowly ovoid, barely compressed laterally, slightly rugose, leafy bracts, leaf apical, unifoliate. *Leaf* to 6 cm long by up to 1 cm wide, subpetiolate, lanceolate to linear-lanceolate, apex acute, lamina fleshy, thick. *Inflorescence* a raceme, to 4 cm long, ascending to decumbent, lateral. *Flower* 1.5–2 cm, to 6 in number, simultaneous, resupinate, spreading widely.

Range, elevation and habitat: *Gomesa colorata* is endemic to the state of Espírito Santo, Brazil, where it grows as an epiphyte in the foothills of the coastal mountains at elevations of 300–1000 m. This species appears to be uncommon to rare in nature, likely due to its relatively small range. Threats include poaching, land clearance and deforestation. No habitat or confirmed blooming records are known.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, small rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. This species can also be grown potted using a fine bark mix or moss. *Temperature* intermediate to cool. *Light* bright shade. *Watering* water frequently, allowing the roots to dry briefly between waterings. *Humidity* high. *Air movement* good. *Propagation* by division or seed. This uncommon species should be propagated whenever possible to increase cultivated stocks. *Fertilise* at 1/4 strength weekly.



Figure 4.643 (above) A splendid *Gomesa colorata* mounted specimen in full flower (Grower: Alfred Hockenmaier. Photo: Joe Herbert).

GOMESA

Comments: This bright, colourful little species is not commonly seen in collections, and efforts to propagate and disperse it are recommended. *Gomesa colorata* has not been in cultivation for very long, but even so, plants labelled as *Oncidium coloratum* or *Carria colorata* are already present in some collections owing to rapidly changing orchid taxonomy. There are many similarities between this showy species and the group of plants recently known as *Baptistonia* and, like them, it was recently incorporated into *Gomesa*. Both *G. colorata* and the former constituent species of *Baptistonia* differ morphologically from the rest of *Gomesa*, as currently understood; the pseudobulbs are nearly round in cross section, not laterally compressed with carinate edges. In cultivation, this species typically blooms in the autumn.

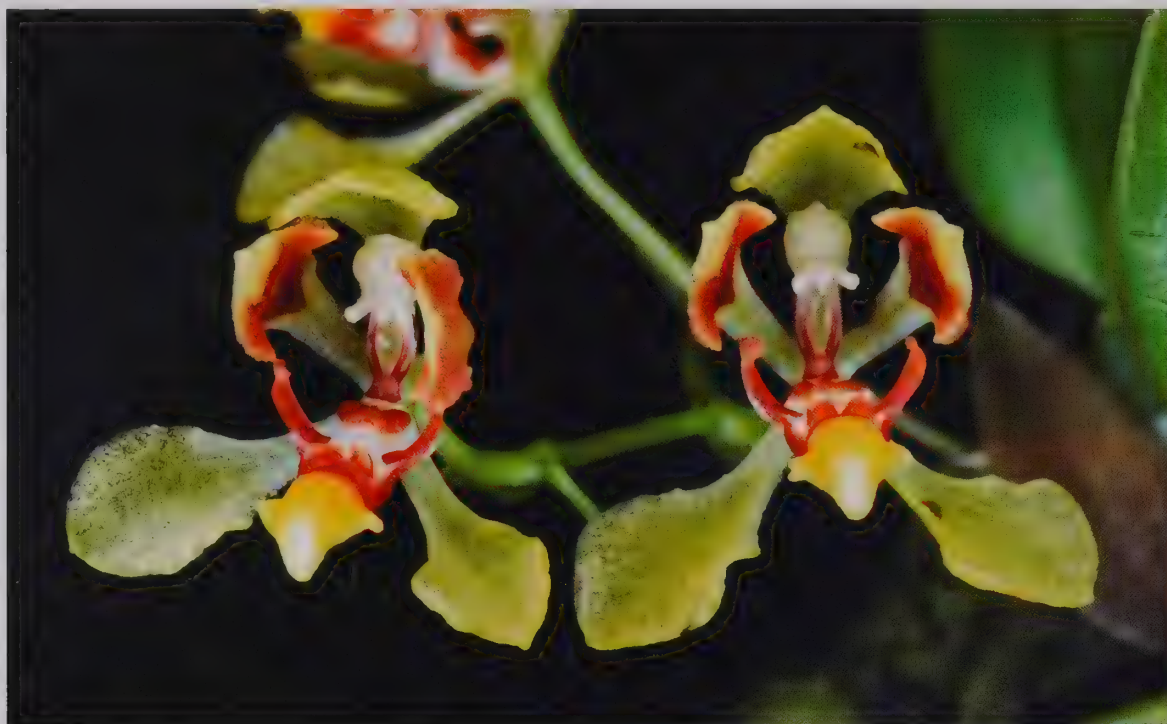


Figure 4.644 (above) The flowers of *Gomesa colorata* are striking in both form and colour (Grower: Marni Turkel).

Figure 4.645 (below) A *Gomesa colorata* inflorescence bearing many colourful flowers (Photo: Ron Kaufmann).

GOMESA

Gomesa eleutherosepala (Barb.Rodr.) M.W.Chase & N.H.Williams

Publication: *Ann. Bot. (Oxford)* 104: 396 (2009)

Etymology: From the Greek *eleuthero* (free) and *sepala* (sepals), referring to the sepals which appear unconnected.

Homotypic synonyms: *Rodriguezia eleutherosepala* Barb.Rodr., *Rodrigueziopsis eleutherosepala* (Barb.Rodr.) Schltr.

Morphology: *Plant* to 9 cm tall (individual growths), climbing, long-repent/stoloniferous, pseudobulbs spaced to 50 cm apart along rhizome (less in cultivation). *Pseudobulb* to 2.5 cm tall by 1.3 cm wide, ovoid, bilaterally compressed, leafy bracts two, leaves apical, two in number. *Leaf* to 7 cm long by 2.5 cm wide, lanceolate, apex acuminate, lamina deeply keeled, erect to suberect, leathery, leafy bracts suberect to spreading. *Inflorescence* a raceme, to 5 cm long, filiform, laterally from base of pseudobulb. *Flower* to 1 cm long, to 4 in number, simultaneous, widely spreading.

Range, elevation and habitat: An endemic Brazilian species, *Gomesa eleutherosepala* occurs in the states of Rio de Janeiro, Paraná and Santa Catarina at elevations of 600–1500 m. It grows as a locally common epiphyte in the forest canopy, sometimes travelling to nearby trees through extensions of the rhizome.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. Due to its rambling habit this species is not suited to pot culture. Even though this plant should be grown on a mount, it rarely stays attached to it, wandering freely through collections by way of its stolon-like rhizome. *Temperature* intermediate to cool. *Light* bright shade. *Watering* water frequently, allow to dry briefly between waterings. *Humidity* high. *Air movement* good to brisk. *Propagation* easily by division or seed.

Comments: *Gomesa eleutherosepala* is one of two species of the former genus *Rodrigueziopsis*. It has a vine-like growth habit that is very atypical for an orchid, with plants producing long, thin stolon-like runners between the pseudobulbs. The authors have observed small *G. eleutherosepala* plants twining around parts of greenhouses, weaving in and out of the supporting mesh of other plants, around poles, pots, hangers and other fixtures. The long rhizome is relatively brittle, so it is not uncommon for a grower to end up with many individual plants, many of them nearly impossible to extract from their surroundings. When the plants bloom in the autumn, the sprays of cheerful little white flowers only add to the charm. This is an easy plant to propagate and share with friends, and it is highly recommend.



Figure 4.646 (above) The flower of *Gomesa eleutherosepala* (Grower: Marni Turkel).



Figure 4.647 (above) *Gomesa eleutherosepala* inflorescences may bear up to four flowers (Grower: John Leathers).

Grandiphyllum Docha Neto

Publication: Docha Neto, A., 2006, *Colet. Orquídeas Brasil*. 3: 75

Subfamily: Epidendroideae

Tribe: Maxillarieae

Subtribe: Oncidiinae

Type species: *Grandiphyllum divaricatum* (Lindl.) Docha Neto, 2006, *Colet. Orquídeas Brasil*. 3: 75.

Etymology: From the Latin *grandis* (large, strong) and the Greek *phyllum* (leaved), in reference to the large leaves of the type species.

Heterotypic synonym: *Aurinocidium* Romowicz & Szlach.

Profile: A genus of 6 species, occurring from Southern Brazil to northeastern Argentina.

General plant morphology: Small to large, epiphytic, rarely lithophytic, sympodial. *Pseudobulb* relatively small in relation to leaves, unifoliate. *Leaf* usually sessile, bifacial, dorsiventrally flattened, leathery. *Inflorescence* usually a panicle, usually longer than leaves, lateral from base of pseudobulb. *Flower* few to many, resupinate, spurless, sepals and petals free, subsimilar, lip usually trilobed, callus with finger-like processes or raised, pilose pad in middle of basal lobe, column straight, with rounded wings, pollinia 2.



Figure 4.648 (above) The richly coloured flowers of *Grandiphyllum edwallii*, from the south and southeast of Brazil (Grower: Orchid Species Plus).

GRANDIPHYLLUM

Grandiphyllum edwallii (Cogn.) Docha Neto

Publication: *Colet. Orquídeas Brasil*. 3: 75 (2006)

Etymology: Named for Gustavo Edwall (1862–1946), gardener, botanist and explorer who was associated with the herbarium at the botanical garden at Tremembé, São Paulo, Brazil.

Homotypic synonyms: *Oncidium edwallii* Cogn., *Aurinocidium edwallii* (Cogn.) Romowicz & Szlach.

Heterotypic synonyms: *Epidendrum monophyllum* Vell. nom. illeg., *Oncidium aberrans* Schltr., *Grandiphyllum aberrans* (Schltr.) Docha Neto.

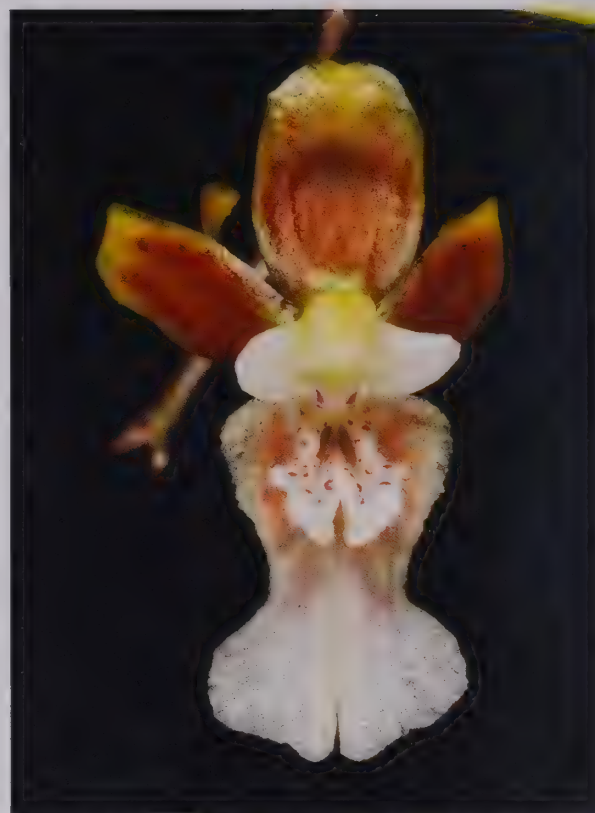
Morphology: *Plant* 7.5–12.5 cm tall, clumping, branching, slowly creeping, pseudobulbs clustered. *Pseudobulb* 1.2–2.6 cm long by 1.2–1.6 cm wide, narrowly elliptical to oblong to ovoid in profile, strongly compressed, edges sharply carinate, greyish-green, sometimes stippled with purple, mature bulbs with opposite papery bracts. *Leaf* to 11 cm long by 2.5 cm wide, sessile to minutely petiolate, folded towards base, elliptic to narrowly oblong to oblong to slightly ovate, apex acute, lamina suberect, fleshy, somewhat flexible, grey-green. *Inflorescence* a panicle, to 10 cm long, peduncle about equal to rachis, erect to spreading, slender, flexuose, reddish in colour, lateral. *Flower* to 1.7 cm long, several to many in number, mostly simultaneous, resupinate, widely spreading. Sepals and petals vary from almost solid yellow to reddish brown with yellow margins, lip yellow to yellow with reddish brown markings at the base.

Range, elevation and habitat: *Grandiphyllum edwallii* occurs in southern and southeastern Brazil, where it grows epiphytically in hot humid lowlands, marshy areas in the interior, and cool, moist, coastal mountains of the Mata Atlântica (states of Minas Gerais, Espírito Santo, São Paulo, Rio de Janeiro, Paraná, Santa Catarina and Rio Grande do Sul) at elevations of 500–900 m. It also occurs in Argentina in the province of Misiones. Conservation status unknown.

Culture recommendations: *Substrate* mount on cork bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. *Temperature* intermediate to intermediate-cool. This species likes warm days and cooler nights. *Light* bright shade. *Watering* water frequently, allow to dry briefly between waterings. Reduce water as bulbs mature, and through the winter months. *Humidity* average (50–60 %) to high. *Air movement* good to brisk. *Propagation* by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, but reduce as bulbs mature and withhold during winter.

Comments: *Grandiphyllum edwallii* is known to few people by this name, *Oncidium edwallii* being more familiar, and even so, probably not to many. The small, flattened flowers look very much like a typical *Oncidium*. The plants are quite attractive, with an interesting pseudobulb that carries a single, thick, fleshy leaf. Borne from an inflorescence at the base of the pseudobulb, the flowers usually appear in early to mid-autumn in cultivation.

There is much confusion surrounding the identification of *G. edwallii* and *G. hians*; these species are frequently mixed up in books and online, with many pictures mislabelled. However, as illustrated here and in the subsequent entry, when both species are seen together, there can be little room for confusion.

GRANDIPHYLLUM**GRANDIPHYLLUM***Grandiphyllum hians* (Lindl.) Docha Neto**Publication:** *Colet. Orquídeas Brasil*. 3: 75 (2006)**Etymology:** From the Latin *hians* (open, gaping), referring to the large teeth of the callus.**Homotypic synonyms:** *Oncidium hians* Lindl., *Aurinocidium hians* (Lindl.) Romowicz & Szlach.**Heterotypic synonyms:** *Oncidium quadricorne* Klotzsch, *Oncidium leucostomum* Hoffmanns. ex Lindl., *Oncidium maxilligerum* Lem.**Morphology:** *Plant* to 12 cm tall, clumping, branching, slowly creeping, ascending, pseudobulbs clustered. *Pseudobulb* to 2 cm tall and 2 cm wide, sub-orbicular in profile, depressed at apex, slightly compressed laterally, carinate, leaf apical, unifoliate. *Leaf* 3–10 cm long by 0.8–2.5 cm wide, sessile, elliptic-oblong, narrowly oblong, ovate to lanceolate, apex acute, lamina erect to suberect, rigid, fleshy, leathery, grey green in colour. *Inflorescence* a raceme to few branched panicle, to 10 cm long, 2–3 simultaneous inflorescences, erect to suberect, wiry, flexuose, reddish in colour, lateral from mature pseudobulb. *Flower* 1–1.5 cm long, few to many in number, simultaneous, resupinate, widely spreading, segments occasionally reflexed, lip white to whitish yellow with irregular, dark rose spotting at base, proportionately large, forward jutting, callus with 4–6 pointed teeth, as long as and parallel to the proportionately large column. Segment colour from mostly yellow to reddish brown with yellow margins.**Range, elevation and habitat:** *Grandiphyllum hians* is a common species that occurs in Brazil (states of Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul) and the Misiones province of Argentina at elevations up to 1000 m. It may also occur in Peru. In Brazil, it grows epiphytically on inland tablelands of stunted vegetation, in cool montane forest and in tropical coastal forest in bright situations, but not in direct sun and with moderate humidity. It blooms in late spring to summer. In Argentina, it grows in seasonally semi-deciduous forest, and also in regions without a dry season. In the latter habitats, it is found on trunks and branches of trees at 2–2.5 m above the ground, where days are warm and nights cool and humid. It blooms in January to March.**Culture recommendations:** *Substrate* mount on cork, bark, rough-barked hardwood, rough wood shingles or possibly tree fern, using a small amount of New Zealand *Sphagnum* moss around the roots. It may also be grown potted in fine bark mix or moss. *Temperature* intermediate to intermediate-cool. This species favours warm days and cooler nights. *Light* bright diffuse to bright shade. *Watering* water frequently, allow to dry briefly between waterings. Reduce water as bulbs mature, and through winter. *Humidity* average (50–60 %) to high. *Air movement* good to brisk.**Figure 4.649 (above)** The flower of *Grandiphyllum hians* in detail (Grower: Marni Turkel).**Figure 4.650 (above)** A trio of *Grandiphyllum hians* blooms (Grower: White Oak Orchids).

GRANDIPHYLLUM

Propagation by division or seed. *Fertilise* at 1/4 to 1/2 strength weekly, but reduce as bulbs mature and withhold fertiliser entirely during the winter.

Comments: *Grandiphyllum hians*, more commonly known as *Oncidium hians*, is vegetatively quite similar to *G. edwallii*, although the flowers are quite distinct. The cute little flowers of *G. hians* often have swept-back segments, with a proportionately large, somewhat forward-jutting white lip with a rather prominent, toothed callus under a distinctly large column. The flowers are loosely borne on a few-branched panicle. Plants in cultivation bloom at approximately the same time as they do in nature, between late spring and late summer.



Figure 4.651 (above) The wiry inflorescence of *Grandiphyllum hians* bearing three simultaneously opened flowers (Grower: Judy Carney).

Figure 4.652 (overleaf) The cheerful flowers of *Grandiphyllum harrisonianum* (Grower: Andy's Orchids).






Ron Parsons (left) and Mary Gerritsen (right) have cultivated, studied and photographed orchids all over the world. They prepared this two volume work in order to provide a comprehensive and beautifully illustrated guide to some of the world's finest miniature orchid taxa.

Front cover: the striking, pendent flowers of *Bulbophyllum thaiorum* are brilliantly coloured (Grower: White Oak Orchids).

Back cover: the remarkable little bloom of *Masdevallia phoebe* (Grower: Elle Ronis).



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